

1. Finite Element Simulation of Temperature and Current Distribution in a Superconductor, and a Cell Model for Flux Flow Resistivity-Interim Results

By Reiss, Harald

From [Journal of Superconductivity and Novel Magnetism](#) (2016), 29(6), 1405-1422. Language: English, Database: CAPLUS, DOI:10.1007/s10948-016-3492-4

A review. A crit. problem arises when current distribution in a high-temp. superconductor and its stability against quench shall be predicted: is it correct to assume homogeneous temp. distribution in superconductors, in general or only in LHe-cooled devices. The finite element anal. presented in this paper shows that during the very first instants following a disturbance, like single Dirac or periodic heat pulses, or large fault currents, temp. distribution in a **BSCCO 2223** conductor is highly inhomogeneous. This is because disturbances, of transient or continuous, isolated or extended types in conductor vols., create hot spots of comparatively long life cycle. As a consequence, sepn. between Ohmic and flux flow current limiter types, or decisions on the mechanism that initialises current sharing, cannot be made definitely. A semi-empirical cell model is presented in this paper to est. flux flow resistivity in multi-filamentary superconductors in a successive approxn. approach. Weak links are modelled, as nano- and microscopic surface irregularities and corresponding resistances, in analogy to thermal transport. Though the model requests input of a large amt. of data (dimensions, porosities, field-dependent quantities) that still have to be verified exptl., it is by its flexibility superior to ideas relying on, for example, imagination of sep., non-interacting chains of strong and weak links switched in parallel. In particular, and in contrast to the std. expression to calc. flux flow resistivity, the cell model suggests to replace solid conduction by an effective resistivity, a method that is more appropriate for multi-filamentary conductors. The paper also discusses integration time steps in numerical simulations that have to be selected in conformity with several characteristic times of current and thermal transport.

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2. Stability of superconducting phases of **BSCCO** ceramics in strong alkaline solutions

By Ivanova, G.; Stoyanov, L.; Terzieva, S.; Stoyanova-Ivanova, A.; Mladenov, M.; Kovacheva, D.; Raicheff, R.

From [Nanoscience & Nanotechnology \(Sofia, Bulgaria\)](#) (2014), 14, 33-34. Language: English, Database: CAPLUS

Ceramic powders of cuprates superconducting systems Bi-Sr-Ca-Cu-O (**BSCCO 2223**, 2212 and 2201) were prepd. by solid-state synthesis. The interaction of the ceramics with alk. soln. was studied by analyzing the phase formation and structure modification before and after exposure to 7M KOH. The high chem. resistance of the ceramics in concd. alk. solns. is well proven by XRD and SEM observations. The study revealed that **BSCCO** samples are remarkably stable and these results are important for practical applications of this type of superconducting ceramics as additives and electrode materials in alk. batteries.

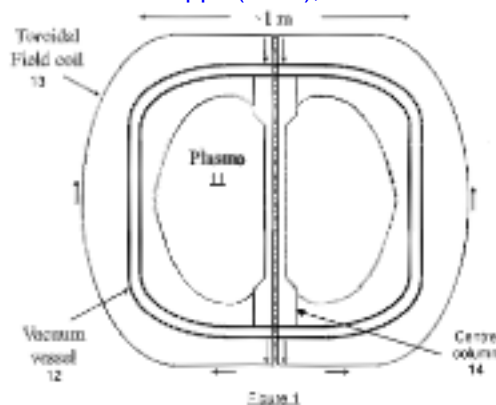
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3. Hybrid magnet for use in fusion reactors

By Kingham, David; Gryaznevich, Mikhail

From [Brit. UK Pat. Appl.](#) (2016), GB 2529412 A 20160224, Language: English, Database: CAPLUS



A toroidal field coil is disclosed for generating a toroidal magnetic field in a nuclear fusion reactor comprising a toroidal plasma chamber having a central column. The portion of toroidal field coil passing through the central column comprises: a low temp. superconductor (LTS) layer formed from, for example, niobium-tin or niobium-titanium; a high temp. superconductor (HTS) layer formed from, for example, ReBCO (YBCO or GdBCO), **BSCCO 2212**, **BSCCO 2223**, or MgB₂, and located radially outward of the LTS layer; and an elec. conducting, non-superconducting material, e.g. copper, beryllium or aluminum, located radially outward of the HTS and LTS layers. Neutron shielding may be provided between the hybrid magnet and fusion plasma, and insulating vacuum gaps between the different layers of conducting and superconducting material.

~0 Citings

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4. Prospects for the use of HTS in high field magnets for future accelerator facilities

By Ballarino, A.

From [CERN Document Server: Preprints \(2014\), 1-7](#). Language: English, Database: CAPLUS

The enthusiasm that followed discovery of High Temp. Superconductors (HTS) and the initial genuine hope of a replacement technol. that could have taken over from conventional Low Temp. Superconductors (LTS) was damped during the years by difficulties in reaching performance levels of competing materials: insufficient current-carrying performance, short piece lengths, and fragility of the brittle oxide superconductors made development of applications slow and limited to demonstrators or devices less demanding from the point of view of conductor performance. However, thanks to a continuous R&D effort, significant progress was made in the past years on the development of cuprate superconductors. Today long lengths of **BSCCO 2223** (km range) and REBCO (a more general acronym for YBCO, where RE = Rare Earth) tape (hundreds of meters range) conductor with controlled and homogeneous characteristics are com. available, and tremendous progress has been made in the development of BSCCO 2212 round wire, where understanding of current limiting mechanism and implementation of a new prodn. process has enabled a breakthrough with record elec. performance. Even if still at the research level, attainments in materials synthesis and theor. understanding of phys. properties of iron-based materials have increased optimism in the possibility of their development into practical superconductors. High upper crit. field and low anisotropy are attractive features for potential high field applications of iron-based tapes and wires. Parameters of merit of a superconductor depend on the operating conditions and on the specific requirements given by the application. A review of the potential of HTS for accelerator technol. is presented, with a focus on the presently achieved performance of materials and on the perceived needs for further development for use in future accelerator facilities.

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5. Development of 16 kA HTS current leads for 40 T hybrid magnet application

By Bi, Y.; Ding, K.; Feng, H.; Liu, C.; Liu, X.; Lu, K.; Wu, H.; Song, Y.; Xu, C.; Ye, B.; et al

From [Journal of Physics: Conference Series \(2014\), 507\(11th European Conference on Applied Superconductivity, 2013\), 32013/1-32013/4, 4](#). Language: English, Database: CAPLUS, DOI:10.1088/1742-6596/507/3/032013

A pair of 16 kA high temp. superconducting current leads which will serve a 40 T hybrid magnet at the CHMFL was designed, manufd. and performed the factory acceptance test at the ASIIPP site. The major design includes the LN2-cooling copper heat exchanger part as well as the HTS module made of **BSCCO 2223**/AgAu matrix tapes in parallel which allows the operation of the current lead at a min. coolant mass flow. The paper briefly describes the design of the 16 kA HTS current leads. And the cold test results of current leads are also presented in the paper.

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6. Method for the synthesis of superconductors of the **BSCCO-2223** and **BSCCO-2212** type by irradiation of microwaves in a single step and the synthesized superconductors

By Vasilievna Kharissova, Oxana; Ildusovich Kharissov, Boris; Mendirichaga Orozco, Fernando; Cueva Zambrano, Angel Antonio; Cueva Zambrano, Miguel

From [Mex. Pat. Appl. \(2014\), MX 2013001495 A 20140902](#), Language: Spanish, Database: CAPLUS

The present invention refers to a method for the synthesis of superconductors of the **BSCCO-2223** and **BSCCO-2212** type by the irradiation of microwaves and pressure. The present invention refers to the method for obtaining superconductors of the **BSCCO-2223** and **BSCCO-2212** type in short times and low temp. An advantage of the present invention is that it includes a single-step method for obtaining superconductors of the **BSCCO-2223** and **BSCCO-2212** type in large amounts. The synthesis was carried out in hydrothermal conditions under microwave irradiation, which allows an easy and affordable way to be created and obtained (heating in a single step for 2 h 25 min).

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7. Analytical formulation of I_c dependence on torsion of YBCO and **BSCCO** conductors

By Fleiter, J.; Sitko, M.; Ballarino, A.

From [IEEE Transactions on Applied Superconductivity \(2013\), 23\(3, Pt. 3\), 8000204/1-8000204/4](#). Language: English, Database: CAPLUS, DOI:10.1109/TASC.2012.2228292

The behavior of HTS tapes under torsion is of key importance for the definition of the allowable twist during cabling activity. In this paper, we report on the elaboration of self-consistent anal. expressions of I_c dependence on twist pitch for YBCO and **BSCCO (2223)** conductors. The computed expressions are validated with the results of a series of tests performed at 77 K and in self-field with a purpose-built setup. The I_c was obsd. to be reduced to 95% of the unstrained value for twist pitches of 114 mm for **BSCCO** tapes, and 80-90 mm for YBCO tapes. The redn. of performance was identified to be caused mainly by irreversible degrdn. of I_c at the tapes edges. At lower temps., a slightly lower sensitivity to twist is expected.

~1 Citing

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8. Analytical formulation of I_c dependence on torsion of YBCO and **BSCCO** conductors

By Fleiter, J.; Sitko, M.; Ballarino, A.

From [CERN Document Server: Preprints \(2013\)](#), 1-5. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2012.2228292

The behavior of HTS tapes under torsion is of key importance for the definition of the allowable twist during cabling activity. In this paper, we report on the elaboration of selfconsistent anal. expressions of I_c dependence on twist pitch for YBCO and **BSCCO (2223)** conductors. The computed expressions are validated with the results of a series of tests performed at 77 K and in self-field with a purpose-built setup. The I_c was obsd. to be reduced to 95% of the unstrained value for twist pitches of 114 mm for **BSCCO** tapes, and 80-90 mm for YBCO tapes. The redn. of performance was identified to be caused mainly by irreversible degrdn. of I_c at the tapes edges. At lower temps., a slightly lower sensitivity to twist is expected.

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9. Test results of central magnetic field and field uniformity of a high temperature superconducting magnet with gap

By Kim, Youngmin; Kang, Myunghun; Ku, Myunghwan; Cha, Gueesoo; Paik, Kyoungcho; Yoo, Choong-hyun

From [IEEE Transactions on Applied Superconductivity \(2012\)](#), 22(3), 9501905/1-9501905/5. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2011.2177055

Due to the magnetic anisotropy of a High Temp. Superconducting (HTS) tape, inserting a gap between pancake windings can increase the central magnetic field and improve the field uniformity of HTS magnets consisting of pancake windings. Although inserting gaps with const. length can increase the central magnetic field, optimizing the length of each gap to maximize the central magnetic field is preferred. This paper shows the test results of HTS magnets with and without optimized gaps. Both magnets consisted of 12 **BSCCO-2223** pancake windings. The test results were compared with the calcn. results, and confirmed that the central magnetic field of the HTS magnet with optimized gap was increased compared with the HTS magnet without gap. The magnetic field uniformity of the HTS magnet was also improved.

~0 Citings

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10. Inductive method for the determination of the critical current I_c of HTS stators in axial flux configuration

By Gonzalez-Parada, A.; Espinosa-Loza, F. J.; Bosch-Tous, R.

From [IEEE Transactions on Applied Superconductivity \(2012\)](#), 22(3), 9500104/1-9500104/4. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2011.2178574

This work presents the evaluation and detn. of the crit. current (I_c) of HTS stators in axial flux configuration. The stator construction was done considering the previously definite and optimized geometry, by cutting and soldering the sections of HTS tape in order to get the axial flux poles configuration. By this reason and due to the construction method, a redn. value of the initial crit. current was presented. This redn. increases because of the stator pole nos. or the no. of the welded joints. If the method of the four-lead is used, this one can introduce an addnl. error to the measurement of I_c , which can present confusion. The inductive sensors used in the present work are based on the use of a Rogowski coil placed at the terminal end in order to observe the behavior of the circulating current in the superconductor stator. When the current flows through a superconductive tape and this one is increased, the behavior of the tension of the third harmonic also increases (V_3) and it is induced in the coil. By this reason the tension value of the crit. state V_3 can be detd. and it is proportional to the amplitude of the driven current I_0 . Due to the characteristics of the signal to measure, it is necessary to make a signal conditioning. This conditioning was obtained using a filtering circuit and an integrator, connected to a data acquisition system (DAQS). The design of the filtrate parameters and the circuit of integration are presented altogether with the comparative results of the inductive measurement method and the four-lead method on tapes and stator.

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11. Application of HTS **BSCCO** tapes in an ironless axial flux superconductor motor

By Gonzalez-Parada, A.; Espinosa-Loza, F. J.; Castaneda-Miranda, A.; Bosch-Tous, R.; Granados-Garcia, X.
From [IEEE Transactions on Applied Superconductivity](#) (2012), 22(3), 5201004/1-5201004/4. Language: English,
Database: CAPLUS, DOI:10.1109/TASC.2011.2178372

The development of HTS superconductor motors has been focused on the traditional construction, mainly in the magnetic field in radial flux configuration like the traditional elec. motors, for this reason the design and construction of superconductor machines in axial magnetic flux configuration are a new alternative for the development of the HTS superconductor motors. In this work, calcns. for design and optimization of a superconductor biphasic induction motor in axial flux configuration are presented. The motor construction was made with **BSCCO-2223** tape, its respected elec. evaluation and results are presented in geometries of 4, 6, and 8 poles in an ironless stator. A wound rotor was made with **BSCCO** tapes in order to test within the stators superconductor developed. The optimization of rotor tests was carried out at the beginning with aluminum rotors. After that, some wound superconductor rotors were constructed on a flat squirrel cage configuration for evaluation with superconductor stators.

~0 Citings

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12. Development of axial flux HTS induction motors

By Gonzalez-Parada, A.; Guiau, M.; Ibarra, O.; Guzman, R.
From [Procedia Engineering](#) (2012), 35, 4-13. Language: English, Database: CAPLUS,
DOI:10.1016/j.proeng.2012.04.159

Development of High Temp. Superconductors (HTS) motors has been focused on typical construction with radial magnetic flux configuration similar to traditional elec. motors. Design and construction in axial magnetic flux configuration are a new alternative to develop HTS motors. This paper presents the design and optimization of a superconductor induction motor in axial flux configuration, using HTS **BSCCO-2223** tapes. Elec. evaluation and results in geometries of 4, 6, and 8 poles of an ironless stator are presented. The axial flux poles configuration of the stator was constructed by cutting and welding the HTS tapes sections. However, due to this construction method, a redn. in the crit. current (I_c) was presented, observing an increasing redn. by increasing the pole no. or the no. of the welded joints. The evaluation and detn. of the I_c of HTS stators in axial flux configuration by inductive methods are presented.

~1 Citing

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13. International round Robin test for mechanical properties of **BSCCO-2223** superconductive tapes at room temperature [Erratum to document cited in CA155:603987]

By Osamura, K.; Weiss, K.-P.; Shin, H.-S.; Katagiri, K.; Ochiai, S.; Hojo, M.; Sugano, M.; Ohsawa, K.
From [Cryogenics](#) (2011), 51(10), 613. Language: English, Database: CAPLUS, DOI:10.1016/j.cryogenics.2011.08.002

On page 25, Table 7 contained an error; the cor. table is given.

~0 Citings

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14. Properties of high temperature superconducting magnet with optimized air gap between pancake windings

By Kim, Youngmin; Ku, Myunghwan; Cha, Gueesoo; Park, SungJong
From [IEEE Transactions on Applied Superconductivity](#) (2011), 21(3, Pt. 2), 2267-2270. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2010.2089034

In a magnet with pancake windings, inserting a gap between the pancake windings can increase the central magnetic field. This paper shows the optimized length of each gap is able to maximize the central magnetic field. Inserting a gap also improves field uniformity because the pancake windings are spread across a wider area. A high temp. superconducting (HTS) magnet consisting of **BSCCO-2223** pancake windings was chosen for the calcn. model to show the effectiveness of the proposed method. The E - J relation was used to det. the crit. current, and an evolution strategy was adopted for the optimization of gap length. The results of calcns. show that the crit. current and the central magnetic field increased by 86.0% and 33.7%, resp., for a magnet consisting of ten pancake windings.

~1 Citing

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15. A 1.3-GHz LTS/HTS NMR magnet - a progress report

By Bascunan, Juan; Hahn, Seungyong; Park, Dong Keun; Iwasa, Yukikazu

From [IEEE Transactions on Applied Superconductivity](#) (2011), 21(3, Pt. 2), 2092-2095. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2010.2086995

In this paper we present details of a 600 MHz HTS insert (H600) double pancake (DP) windings. It will first be operated in the bore of a 500 MHz LTS magnet, achieving a frequency of 1.1 GHz. Upon completion of H600, we will embark on the final phase (Phase 3B) of a 3-Phase program began in 2000: completion of a high resolu. 1.3 GHz LTS/HTS magnet. In Phase 3B, the H600 will be coupled to a 700 MHz LTS magnet to achieve the ultimate frequency of 1.3 GHz. The HTS insert is composed of two concentric stacks of double pancakes, one wound with high strength **BSCCO-2223** tape, the other with YBCO coated conductor. Details include conductor and coil parameters, winding procedure, DPs mech. support and integration to the background 500 MHz LTS magnet. Test results of individual DPs in LN2 are also presented.

~8 Citings

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16. Investigation of an optimum structure for mechanical butt joint of a stacked HTS cable with a metal jacket

By Ito, Satoshi; Hashizume, Hidetoshi

From [IEEE Transactions on Applied Superconductivity](#) (2011), 21(3, Pt. 2), 1995-1999. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2010.2100346

Mech. butt joint of a high-temp. superconducting (HTS) cable with a metal jacket has been investigated for a remountable HTS magnet where parts can be mounted and demounted iteratively to allow a superconducting magnet for a fusion reactor to be assembled and repaired. In this study, an optimum structure to achieve relatively uniform contact pressure distribution on joint surface in the mech. butt joint was suggested by structural anal. Then, joint resistance in mech. butt joint of a stacked **BSCCO 2223** cable with copper jacket was evaluated exptl. using an exptl. setup established based on the structural anal., to confirm effect of decreasing joint resistance by the joint structure. The results showed that the structure can reduce joint resistance to 140 nΩ for the **BSCCO 2223** cable having 1 kA of crit. current at liq. nitrogen temp.

~6 Citings

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17. Slimformer-self-limiting transformer pre-prototype and pilot plant design, construction, and tests

By Vajda, Istvan; Hyde, Andrew; Gyore, Attila; Nador, Gabor; Trollier, Thierry; Sailer, Bernd; Bohm, Roland

From [IEEE Transactions on Applied Superconductivity](#) (2011), 21(3, Pt. 2), 1298-1302. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2011.2108251

The current limiting or self-limiting transformer, (CLT) is a multifunctional device, which combines the functions of a power transformer with the functions of a current limiter. The investigated SLIMFormer consists of a room temp. primary winding and a secondary high temp. superconductor (HTS) winding (**BSCCO 2223**) divided into two parts located on different limbs and up to 4 HTS ring (**BSCCO 2212**). The primary winding is connected to the elec. network, the secondary winding is intended to supply an HTS cable. As a result the SLIMFormer is an inductive terminal between the room temp. network and a projected HTS cable. For investigation of the SLIMFormer a 100 kVA rating exptl. device (pilot plant) was designed, built and tested. The design and optimization aspects as well as the construction of the pilot plant will be presented. The present work is based on the previous 20 kVA SLIMFormer pre-prototype device which was tested at Lab of DEPE BME. The SLIMFormer was investigated exptl. for both sudden short circuit and steady-state (transformer) operational modes. The activation currents were detd. for both operational modes with the rated secondary winding turn ratio. SLIMFormer work is being performed as part of an EC funded project, project name: acronym SLIMFormer.

~0 Citings

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18. International round Robin test for mechanical properties of **BSCCO-2223 superconductive tapes at room temperature [Erratum to document cited in CA155:603987]**

By Osamura, K.; Weiss, K.-P.; Shin, H.-S.; Katagiri, K.; Ochiai, S.; Hojo, M.; Sugano, M.; Ohsawa, K.
From [Cryogenics \(2011\), 51\(7\), 415](#). Language: English, Database: CAPLUS, DOI:10.1016/j.cryogenics.2011.04.008

On page 21, the author list contained an extra author; the cor. author list is given.

~0 Citings

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19. The Calculation of an Air Gap Between Pancake Windings in a Superconducting Magnet by Using the Response Surface Method

By Kang, Myunghun; Ku, Myunghwan; Kim, Youngmin; Lee, Heejuon; Cha, Gueesoo
From [Journal of Superconductivity and Novel Magnetism \(2011\), 24\(1-2\), 1015-1020](#). Language: English, Database: CAPLUS, DOI:10.1007/s10948-010-0874-x

The effects of a gap at a high temp. superconducting magnet which has an insert magnet and an outsert magnet are examd. Both magnets consist of pancake windings. The optimum gap of an insert magnet and an outsert magnet are calcd. by using the response surface method. The insert magnet consists of 8 YBCO pancake windings. The no. of turns of a pancake winding and the inner diam. of the insert magnet are 60 turns and 40 mm, resp. The outsert magnet consists of 12 **BSCCO-2223** pancake windings. The no. of turns of a pancake winding and the inner diam. of the outsert magnet are 100 turns and 115 mm, resp. The calcn. results show the optimum gap of the insert magnet and the outsert magnet are 0 and 10.3 mm, resp. When there is a gap of 10.3 mm in the outsert magnet the central magnetic field increased by 11.4% from 604.2 to 542.6 mT. RSM is proved to be an effective mean for finding optimum gaps in a shorter time comparing with other non-deterministic optimization technique.

~0 Citings

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20. International round Robin test for mechanical properties of **BSCCO-2223** superconductive tapes at room temperature

By Osamura, K.; Weiss, K.-P.; Shin, H.-S.; Katagiri, K.; Ochiai, S.; Hojo, M.; Sugano, M.; Ohsawa, K.
From [Cryogenics \(2011\), 51\(1\), 21-26](#). Language: English, Database: CAPLUS, DOI:10.1016/j.cryogenics.2010.10.005

International RRT was carried out in order to establish the test method for mech. properties of com. **BSCCO** superconductive tapes under cooperation of seven research labs. From the stress vs. strain curve, the following quantities were evaluated; modulus of elasticity, 0.2% proof strength, fracture strength and stresses at fixed strains. The scatter of measured values was analyzed by evaluating the relative std. uncertainty (RSU), which is the std. uncertainty divided by the av. The expected value of RSU for N = 3 was derived for each mech. quantities. In order to make clear the major contribution to the scatterings, the F test was applied. The major source of RSU's was attributed mostly to the influence of inter-lab. scattering.

~3 Citings

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21. Estimation of uncertainty with the modulus of elasticity measured by means of tensile test for **BSCCO** tapes

By Osamura, Kozo; Nyilas, Arman; Shin, H.
From [Cryogenics \(2010\), 50\(10\), 660-665](#). Language: English, Database: CAPLUS, DOI:10.1016/j.cryogenics.2010.06.009

The international round robin test (RRT) was conducted in order to establish the international std. for the tensile test method for **BSCCO-2223** tape shaped wires. The measurands of mech. properties were statistically analyzed to est. their std. uncertainties and their correlation among labs. Consequently the large variance was obsd. with the modulus of elasticity detd. from the initial loading curve. The reason has been examd. by estg. type B uncertainties causing at every step of the exptl. procedure. With respect to the modulus of elasticity, the grand intra-lab av. of relative std. uncertainty (RSU) obtained from the RRT coincided roughly with that derived by means of type B evaluation. Thus it is emphasized that the type B evaluation is very effective tool for expecting the uncertainties of the observations like the modulus of elasticity. On the other hand, the grand over-all RSU was larger than the grand intra-lab one. The combined std. uncertainties were calcd. by changing the strain rate, but kept other parameters const. In order to suppress the influence from the strain rate to the variance, it has been recommended that the strain rate shall be regulated less than 2×10^{-4} 1/s in the tensile test method.

~2 Citings

22. Improvement of joint structure for mechanical butt joint of stacked BSCCO 2223 cable

By Sakashita, Takeshi; Ito, Satoshi; Hashizume, Hidetoshi

From [IEEE Transactions on Applied Superconductivity](#) (2010), 20(3), 1751-1754. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2010.2043660

A concept of remountable HTS magnet has been proposed to simplify fabrication of a superconducting magnet for a fusion reactor and to reduce maintenance cost of the reactor. For realization of the remountable HTS magnet system, mech. butt joint of a stacked BSCCO 2223 cable has been investigated exptl. with large joint stress. In this study, 10 layered BSCCO 2223 cable with copper jacket is used as a test cable, and the roughness of joint surface is controlled quant. by using several different particle sizes of abrasive particles. Then the relation between the joint stress and resistance is evaluated through the mech. butt joint test of the cable under several exptl. conditions. Although dependence of the joint resistance on the joint stress is obsd. the relationship between roughness and joint resistance is not obsd. clearly due to not coincidence in surface flatness of the test cables.

~1 Citing

23. Design of HTS modular magnets for a 2.5 MJ Toroidal SMES: ReBCO vs. BSCCO

By Lee, Seyeon; Kim, Woo-Seok; Park, Sang-Ho; Lee, Ji-Kwang; Park, Chan; Bae, Joon-Han; Seong, Ki-Chul; Lee, Haigun; Lee, Jong-Hoon; Choi, Kyeongdal; et al

From [IEEE Transactions on Applied Superconductivity](#) (2010), 20(3), 1324-1328. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2010.2041543

A 2.5 MJ HTS SMES is being developed as a national program in Korea. This paper presents design results of modular HTS magnets for the 2.5 MJ toroidal SMES. We considered a choice of BSCCO-2223 or ReBCO tapes as the conductors for the HTS magnets of the SMES. Operating temp. was decided to be 20 K which could be accomplished by conduction cooling with a couple of GM cryo-coolers. Key design factors may include minimization of total conductor requirement and low AC loss.

~2 Citings

24. Study of HTS insert coils for high field solenoids

By Lombardo, V.; Barzi, E.; Norcia, G.; Lamm, M.; Turrioni, D.; Van Raes, T.; Zlobin, A. V.

From [AIP Conference Proceedings](#) (2010), 1218(Advances in Cryogenic Engineering, Volume 55A), 246-253. Language: English, Database: CAPLUS, DOI:10.1063/1.3422481

Fermilab is currently working on the development of high field magnet systems for ionization cooling of muon beams. The use of high temp. superconducting materials (HTS) is being considered for these solenoids using Helium refrigeration. Several studies have been performed on insert coils made of BSCCO-2223 tapes and second generation (2G) YBCO coated conductors, which are tested at various temps. and at external fields of up to 14 T. Crit. current (I_c) measurements of YBCO short samples are presented as a function of bending stress, magnetic field and field orientation with respect to the sample surface. An anal. fit of crit. current data as a function of field and field orientation is also presented. Results from several single-layer and double-layer pancake coils are also discussed. (c) 2010 American Institute of Physics.

~0 Citings

25. Torsion strain effects on critical currents of HTS superconducting tapes

By Takayasu, Makoto; Minervini, Joseph V.; Bromberg, Leslie

From [AIP Conference Proceedings](#) (2010), 1219(Advances in Cryogenic Engineering), 337-344. Language: English, Database: CAPLUS, DOI:10.1063/1.3402320

A torsional twist strain effect on the crit. current of a thin HTS tape has been found to be well described by a longitudinal strain model taking into account the internal shortening compressive strains accompanied with the tensile longitudinal strains due to a torsional twist. The crit. current of a twisted tape is given by the integration of the crit. current densities corresponding to the strain distribution over the tape cross-section using axial strain data of the tape. The model is supported with exptl. results of YBCO and **BSCCO-2223** tapes. It has been also found that torsional twisting effects on the crit. currents of a tape composing of the conventional lapped-tape cable and the twisted stacked-tape cable are described by the same equation as that of a twisted single tape. (c) 2010 American Institute of Physics.

~2 Citings

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26. Detection of the Meissner effect with a diamond magnetometer

By Bouchard, Louis-S.; Acosta, Victor M.; Bauch, Erik; Budker, Dmitry

From [arXiv.org](#), [e-Print Archive](#), [Condensed Matter \(2009\)](#), 1-6, [arXiv:0911.2533v1 \[cond-mat.supr-con\]](#). Language: English, Database: CAPLUS

Magnetometers based on the detection of spin-selective fluorescence of nitrogen-vacancy (NV) centers in diamond are attractive for the study of magnetic properties of nanomaterials due to the possibility of nanometer-scale sensing using NV centers placed in close proximity to the sample. We demonstrate detection of the Meissner effect in a high- T_c superconductor (**BSCCO-2223**, $\text{Bi}_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{10}$) by monitoring the [111]-orientation fine structure spectrum in high-NV d. diamond and cycling the temp. of the superconductor in the presence of a bias field. The variation of the superconductor surface field with temp., $\Delta B(T)$, yields a phase transition temp. T_c of (102 ± 3) K, which agrees with the published value of 105 K. Ests. based on magnetometer sensitivity indicate that a nanodiamond magnetometer would be suited for the interrogation of individual metal clusters or cluster crystals. We propose that this magnetometer be used in the ongoing search for high-temp. supercond., for the study of the paramagnetic Meissner effect or for interrogating magnetic and electronic properties in at. clusters.

~0 Citings

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27. Mechanical butt joint of laminated HTS cable with metal jacket for remountable HTS magnet

By Ito, Satoshi; Kato, Takayuki; Hashizume, Hidetoshi

From [IEEE Transactions on Applied Superconductivity \(2009\)](#), 19(3, Pt. 2), 1536-1539. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2009.2019057

The remountable HTS magnet was proposed to allow a superconducting magnet for a fusion reactor to be assembled and to allow a failed part of the magnet to be replaced or repaired. In this study, joint resistance was evaluated in a mech. butt joint of a stacked **BSCCO 2223** cable with a copper jacket. The fabricated cables could reduce joint resistance to be 400-500 nΩ with a silver-plated layer or an indium-film applied to the joint surface. The exptl. results also showed that parallel joint force is required to reduce joint resistance more without deformation of the joint surface configuration.

~2 Citings

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28. Analysis of the E-J curve of HTS tapes under DC and AC magnetic fields at 77 K

By Shigue, Carlos Yujiro; Tobias Da Cruz, Tatiane; Lamas, Jerika Suely; Baldan, Carlos Alberto; Ruppert Filho, Ernesto

From [IEEE Transactions on Applied Superconductivity \(2009\)](#), 19(3, Pt. 3), 3332-3335. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2009.2018309

The evaluation of the elec. characteristics of tech. HTS tapes are of the key importance in detg. the design and operational features of superconducting power apparatuses as well as to understand the external factors which affect the superconducting performance. In this work we report the systematic measurements of the elec. field vs. c.d., E - J relation of short samples for three com. HTS tapes (BSCCO-2223 tapes, with and without steel reinforcement, and YBCO-coated conductor) at 77 K. In order to get sensitive and noiseless voltage signals the measurements were carried out with DC transport current and subjecting the broad surface tape to DC (0-300 mT) and AC (0-62 mT, 60 Hz) magnetic fields. The voltage is measured by a sensitive nanovoltmeter and the applied magnetic field is monitored by a Hall sensor placed on the tape broad surface. The comparison between the E - J results obtained from the three tapes was done by fitting a power-law equation for currents in the vicinity of the crit. current. For the current regime below the crit. one a linear correlation of the elec. field E against the c.d. is obsd. The BSCCO samples presented the same behavior, i.e., a decreasing of n-index with the increasing DC and AC magnetic field strength. Under AC field the decreasing slope of n-index is steeper as compared to DC field. The n-index curve for the YBCO tape showed similar behavior for AC field, however under DC field in the 0-390 mT range exhibited a slight decreasing of the n-index.

~0 Citings

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29. Study of HTS wires at high magnetic fields

By Turrioni, D.; Barzi, E.; Lamm, M. J.; Yamada, R.; Zlobin, A. V.; Kikuchi, A.

From [IEEE Transactions on Applied Superconductivity](#) (2009), 19(3, Pt. 3), 3057-3060. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2009.2017877

Fermilab is working on the development of high field magnet systems for ionization cooling of muon beams. The use of high temp. superconducting (HTS) materials is being considered for these magnets using Helium refrigeration. Crit. current (I_c) measurements of HTS conductors were performed at FNAL and at NIMS up to 28 T under magnetic fields at zero to 90 degree with respect to the sample face. A description of the test setups and results on a BSCCO-2223 tape and second generation (2G) coated conductors are presented.

~12 Citings

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30. Fundamental study on butt joint of laminated BSCCO 2223 cable with self-joint system

By Ito, S.; Sakashita, T.; Moniwa, K.; Uchida, Y.; Hashizume, H.; Nishijima, G.

From [Tohoku Daigaku Kinzoku Zairyo Kenkyusho Kyojiba Chodendo Zairyo Kenkyu Senta Nenji Hokoku](#) (2009), 42-45. Language: Japanese, Database: CAPLUS

A Cu-jacket BSCCO2223 cable was fabricated and used for bonding test of mech. butt joint. By using the cable, the stress in bonding was decreased and the bonding resistance was decreased by application of Ag plating or In foil.

~0 Citings

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31. Method for manufacturing bismuth-series high-temperature superconducting tape material

By Chen, Xingpin; Li, Mingya

From [Faming Zhuanli Shenqing](#) (2009), CN 101465177 A 20090624, Language: Chinese, Database: CAPLUS

The title tape material uses BSCCO-2223 ($(\text{Bi,Pb})_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_y$) as main phase, and is composed of a metal sheath and a superconductive core inside the metal sheath. The superconductive core comprises (by wt.%) first phase BSCCO-2223 75-98, and second phase composed of two or more of CuO, $(\text{Ca,Sr})_2\text{CuO}_3$, $(\text{Ca,Sr})_{14}\text{Cu}_{24}\text{O}_{41}$, $\text{Bi}_2\text{Sr}_2\text{CuO}_6$, Ca_2PbO_4 , SrCaCuO , CaCuO , and $\text{Pb}_3\text{Sr}_{2.5}\text{Bi}_{0.5}\text{Ca}_2\text{CuO}_y$ 2-25. The metal sheath comprises an inner layer made of Ag or Ag alloy, and an outer layer made of Ni, Cu, Fe, W, Ta, Hf, Mo, Cr, V, Ti, Mn, Co, Nb, Zr, Zn, or Al, or their alloy. The tape material has the advantages of low cost, high supercond., and high mech. strength.

~0 Citings

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32. Progress of evaluation techniques for electromagnetic and mechanical properties of high-temperature composite superconductors

By Osamura, Kozo; Wada, Hitoshi; Ochiai, Shojiro; Hojo, Masaki; Matsushita, Teruo; Akita, Shirabe; Sugano, Michinaka; Machiya, Shutaro; Larbalestier, David; Nyilas, Arman; et al
From [Teion Kogaku \(2009\), 44\(4\), 146-158](#). Language: Japanese, Database: CAPLUS, DOI:10.2221/jcsj.44.146

A review with 30 refs. on remarkable progresses in the development of high temp. superconductors (HTS) such as **BSCCO-2223** tapes and YBCO coated conductors which have been achieved in recent years, where very high engineering crit. current densities (J_c) were reached in long conductor length. It is however necessary to realize simultaneously high strain tolerance of J_c , low AC losses and high mech. strength in order to apply them for practical uses. In the first part of the present review, some crit. techniques to improve microstructures for achieving total performance of BSCCO tapes as well as YBCO coated conductors are suggested. In the major part, the recent progress of evaluation techniques of mechano-electromagnetic properties is introduced. The HTS's are typical composite material consisting of essentially five components. Here the anal. technique is proposed to make clear the mech. properties based on the rule of mixt., while the quant. exptl. method to measure tensile properties is introduced. The crit. current is very sensitive on strain. The strain dependency could be divided into two regions. In the reversible region, the crit. current decreases monotonously for **BSCCO** tapes. On the other hand, YBCO coated conductors give a so-called Ekin's intrinsic behavior for the change of crit. current, where a max. of crit. current appears during the process of increasing tensile strain. In order to understand fully the strain dependences of crit. current, it is absolutely necessary to elucidate the strain state exerted on the superconducting component in the composite. Recently the direct measurements of local strain have been succeeded by means of diffraction techniques using neutron and synchrotron radiation. Their interesting results including a new science are reported in the present review.

~1 Citing

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33. Analysis of AC loss and thermal stability of HTS model coils for 600 kJ SMES

By Park, M.; Kwak, S.; Kim, W.; Lee, S.; Lee, J.; Han, J.; Choi, K.; Jung, H.; Seong, K.; Hahn, S.
From [CryoPrague 2006, Multiconference, Proceedings, Praha, Czech Republic, July 17-21, 2006 \(2006\), 226/1-226/5](#). Language: English, Database: CAPLUS

A 600 kJ Superconducting Magnetic Energy Storage System project using High Temp. Superconductor (HTS) was initiated in 2004 and lead by Korea Elec. Research Institute. HTS model coils are designed and manufd. for the preliminary test before we move to the full scale prototype. Reinforced **BSCCO-2223** wire is used for magnet and the operating temp. is assumed to be 20 K. Even though the SMES is not an AC power device, time-varying current during the charging and discharging period leads to the time-varying magnetic field applied to the magnet and AC loss is generated. In this paper, AC loss and the temp. distribution of the model coils are analyzed and discussed.

~0 Citings

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34. Characteristics of a high temperature superconducting continuous disk winding for high voltage transformers

By Lee, S.; Kim, W.; Park, M.; Choi, K.
From [CryoPrague 2006, Multiconference, Proceedings, Praha, Czech Republic, July 17-21, 2006 \(2006\), 240/1-240/4](#). Language: English, Database: CAPLUS

Most of HTS transformers which have been developed over the world adopted layer windings. But because of the shape of the HTS tapes, the layer winding is unacceptable for high voltage power transformer. Disk windings made with pancake windings have suitable shapes for high voltage HTS transformers but they generate higher AC losses than the layer windings do. To lower the AC losses of HTS transformer windings, every disk has a few turns per disk and is connected in series. We proposed a continuous disk winding for this performance. The continuous disk winding was wound with **BSCCO-2223** tapes and its elec. characteristics were analyzed and tested. The test, composed of the measurement of crit. current and AC loss, was carried out.

~0 Citings

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35. Development of cryogen free Ic measurement system

By Sohn, M. H.; Kim, S.; Sim, K. D.; Lee, E. Y.; Kim, H. M.; Park, H. Y.; Seong, K. C.; Kwon, Y. K.
From [Physica C: Superconductivity and Its Applications \(Amsterdam, Netherlands\) \(2008\), 468\(15-20\), 2161-2164](#). Language: English, Database: CAPLUS, DOI:10.1016/j.physc.2008.05.147

The increasing use of high-temp. superconducting (HTS) materials for advanced power applications has generated much interest in the acquisition of the voltage-current (V-I) characteristic curve to measure the crit. current (I_c) of HTS tape. Cryogen free I_c measurement system for HTS wires or coils was designed and fabricated by using a GM-cryocooler and two HTS current leads. The sample cools conductively by 2nd stage of SRDK-408D cryocooler manufd. by Sumitomo Heavy Industries Ltd. (SHI). Each high temp. end of HTS current leads is thermally connected to 1st stage of the cryocooler and elec. disconnected. HTS tape samples cooled down by ~10 K I_c measurements were conducted on a BSCCO-2212 tape, a BSCCO-2223 tape with joints and a BSCCO-2223 small coil under self-field. A description of cryogen free I_c measurement system design and results from measurements will be presented.

~5 Citings

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36. HTS DC bias coil for 35 kV/90 MVA saturated iron-core fault current limiter

By Gong, W. Z.; Zhang, J. Y.; Cao, Z. J.; Hong, H.; Tian, B.; Wang, Y.; Wang, J. Z.; Niu, X. Y.; Qiu, J.; Wang, S. H.; et al

From [Physica C: Superconductivity and Its Applications \(Amsterdam, Netherlands\) \(2008\), 468\(15-20\), 2050-2053.](#)

Language: English, Database: CAPLUS, DOI:10.1016/j.physc.2008.05.124

A superconductive coil with 141,000 A-turns designed magnetizing power, made of 17,600 m of BSCCO 2223 HTS tapes, was fabricated and tested. This coil was built for a 35 kV/90 MVA satd. iron-core fault current limiter. Computer simulations on the performance of the coil were carried out using ANSYS. The crit. current of the superconducting coil and the DC resistance of the coil, including the non-superconducting joints, were investigated. Spatial distribution of the magnetic field was measured and compared with the simulation results.

~3 Citings

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37. Superconducting electrical machines with double rotor assembly

By Lewis, Clive; Leflem, Graham

From [U.S. Pat. Appl. Publ. \(2008\), US 20080161189 A1 20080703,](#) Language: English, Database: CAPLUS

A superconducting elec. machine has rotor and stator assemblies. A first rotor assembly is located to rotate within a stator assembly and is spaced from the stator assembly by an air gap. A second rotor assembly is located to rotate outside the stator assembly and is also spaced from the stator assembly by an air gap. The first and second rotor assemblies have at least one superconducting field winding. The superconducting field windings are formed from a high-temp. superconducting material such as BSCCO-2223 or YBCO. The double rotor assembly configuration provides a new tech. effect over conventional rotating superconducting machines having a single rotor assembly.

~0 Citings

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38. Novel cryogenic engineering solutions for the new Australian research reactor OPAL

By Olsen, S. R.; Kennedy, S. J.; Kim, S.; Schulz, J. C.; Thiering, R.; Gilbert, E. P.; Lu, W.; James, M.; Robinson, R. A.

From [AIP Conference Proceedings \(2008\), 985\(Advances in Cryogenic Engineering, Volume 53A\), 299-306.](#)

Language: English, Database: CAPLUS

In August 2006 the new 20MW low enriched uranium research reactor OPAL went crit. The reactor has 3 main functions, radio pharmaceutical prodn., silicon irradiation and as a neutron source. Commissioning on 7 neutron scattering instruments began in Dec. 2006. Three of these instruments (Small Angle Neutron Scattering, Reflectometer and Time-of-flight Spectrometer) utilize cold neutrons. The OPAL Cold Neutron Source, located inside the reactor, is a 20L liq. deuterium moderated source operating at 20K, 330kPa with a nominal refrigeration capacity of 5 kW and a peak flux at 4.2meV (equiv. to a wavelength of 0.4nm). The Thermosiphon and Moderator Chamber are cooled by helium gas delivered at 19.8K using the Brayton cycle. The helium is compressed by two 250kW compressors (one with a variable frequency drive to lower power consumption). A 5 T BSCCO (2223) horizontal field HTS magnet will be delivered in the 2nd half of 2007 for use on all the cold neutron instruments. The magnet is cooled by a pulse tube cryocooler operating at 20K. The magnet design allows for the neutron beam to pass both axially and transverse to the field. Samples will be mounted in a 4K to 800K Gifford-McMahon (GM) cryofurnace, with the ability to apply a variable elec. field in-situ. The magnet is mounted onto a tilt stage. The sample can thus be studied under a wide variety of conditions. A cryogen free 7.4 T Nb-Ti vertical field LTS magnet, commissioned in 2005 will be used on neutron diffraction expts. It is cooled by a std. GM cryocooler operating at 4.2K. The sample is mounted in a 2nd GM cryocooler (4K-300K) and a variable elec. field can be applied. (c) 2008 American Institute of Physics.

~0 Citings

39. Angular measurements of HTS critical current for high field solenoids

By Turrioni, D.; Barzi, E.; Lamm, M.; Lombardo, V.; Thieme, C.; Zlobin, A. V.

From [AIP Conference Proceedings \(2008\), 986\(Advances in Cryogenic Engineering, Volume 54\), 451-458](#). Language: English, Database: CAPLUS

An expt. is in the works at Fermilab to confirm that ionization cooling is an efficient way to shrink the size of a muon beam. This would pave the way for Muon Collider machines, which however require in their last stages of acceleration very high field solenoids. The use of high temp. superconducting materials (HTS) is being considered for these magnets using Helium or higher temp. refrigeration. A sample holder was designed to perform crit. current (I_c) measurements of HTS conductors under externally applied magnetic fields varying from zero to 90 degree with respect to the c-axis. This was performed in an ample range of temps. and magnetic field values. A description of the test setup and results for $(\text{Bi,Pb})_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_x$ (BSCCO-2223) tapes, and second generation HTS in the form of 348 superconductor are presented. (c) 2008 American Institute of Physics.

~2 Citings

40. Radiation damage to BSCCO-2223 from 50 MeV protons

By Zeller, A. F.; Ronningen, R. M.; Godeke, A.; Heilbronn, L. H.; McMahan-Norris, P.; Gupta, R.

From [AIP Conference Proceedings \(2008\), 986\(Advances in Cryogenic Engineering, Volume 54\), 416-422](#). Language: English, Database: CAPLUS

The use of HTS materials in high radiation environments requires that the superconducting properties remain const. up to a radiation high dose. BSCCO-2223 samples from two manufacturers were irradiated with 50 MeV protons at fluences of up to 5×10^{17} protons/cm². The samples lost approx. 75% of their pre-irradn. I_c . This compares with Nb₃Sn, which loses about 50% at the same displacements per atom. (c) 2008 American Institute of Physics.

~0 Citings

41. Method for preparing Bi-based high-temperature superconductive wires by isostatic pressing process for increasing core density

By Wang, Xiancheng; Han, Zhenghe; Sun, Jianfeng

From [Faming Zhuanli Shenqing \(2007\), CN 101075486 A 20071121](#), Language: Chinese, Database: CAPLUS

The title method involves (1) prepg. wire contg. \geq superconductive cores having BSCCO-2212 or BSCCO-2223 as main phase and ≥ 1 metal base materials for coating, rolling or drawing the cores, (2) treating the obtained wire at 750-850° under O partial pressure of 0.001-0.02 MPa and total pressure of 0.001-200 MPa for 0.1-100 h to prevent communication between crack and pore in the wire with external high pressure gas medium, (3) treating at 750-850° under O partial pressure of 0.001-0.02 MPa and total pressure of 10-100 MPa for 0.1-200 h, and (4) annealing at 750-800° under O partial pressure of 0.001-0.01 MPa for 3-50 h. The obtained wire has improved elec. and mech. properties. The method with simple operation is suitable for large scale prodn. of Bi-based wires.

~0 Citings

42. Characteristic evaluation of mechanical jointed HTS cable for remountable HTS magnets

By Ito, Satoshi; Takami, Shohei; Hashizume, Hidetoshi; Yamamoto, Yuko; Yuki, Kazuhisa; Sagara, Akio

From [Fusion Science and Technology \(2007\), 52\(4\), 1070-1074](#). Language: English, Database: CAPLUS

Remountable HTS magnets are suggested for as a method to reduce the construction and maintenance costs of a fusion reactor. Butt joints of BSCCO 2223 HTS cable, where cross sections of the cable are jointed mech., have been researched for the new concept. In a previous study, stress distribution on the joint surface in the butt joint was evaluated by numerical anal. The result showed the importance of obtaining homogeneous stress distribution on the joint surface to reduce the joint resistance. Therefore, the relations between the joint resistance and the stress distribution inside the HTS cable is evaluated for several loading systems by structural anal. and expt. Based on the result, an efficient loading system is suggested, which can achieve the uniform stress distribution on the joint surface and can avoid and stress concn.

~3 Citings

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43. Analysis of magnetic field distribution and AC losses of a 600 kJ SMES

By Park, Myung-Jin; Kwak, Sang-Yeop; Kim, Woo-Seok; Lee, Seung-Wook; Lee, Ji-Kwang; Choi, Kyeong-Dal; Jung, Hyun-Kyo; Seong, Ki-Chul; Hahn, Song-yop
From [Cryogenics \(2007\), 47\(7-8\), 391-396](#). Language: English, Database: CAPLUS,
DOI:10.1016/j.cryogenics.2007.04.011

Development of a 600 kJ superconducting magnetic energy storage (SMES) system is being in progress by Korea Electrotechnol. Research Institute (KERI). 3-ply **BSCCO-2223** wire was considered as a conductor for the winding of the SMES system and auto-tuning niching genetic algorithm was adopted for an optimization method of the HTS magnets in the 600 kJ SMES system. Several constraint conditions were considered for optimal design of HTS magnet of SMES system such as operating current, length of HTS wire in piece, gap between double pancake coils, stored magnetic energy, etc. As a result, output parameters for 6 case designs of 600 kJ SEMS were obtained as optimal design results according to the operating currents. In this research, one of the 6 cases was chosen to analyze magnetic field distribution of the 600 kJ SMES system. AC loss for each double pancake module of SMES during discharge period was also calcd. These HTS windings will be applied to the SMES system whose purpose is stabilization of the power grid.

~2 Citings

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44. Short-circuit test of a novel solenoid type high-T_c superconducting fault current limiter

By Lee, Chanjoo; Kang, Hyoungku; Ahn, Min Cheol; Ko, Tae Kuk; Seok, Bok-Yeol
From [Cryogenics \(2007\), 47\(7-8\), 380-386](#). Language: English, Database: CAPLUS,
DOI:10.1016/j.cryogenics.2007.04.016

In the present study, a novel solenoid type bifilar coil is proposed for high-T_c superconducting fault current limiter (SFCL) which is composed of two windings in a bobbin and their winding directions are opposite with each other to have non-inductive characteristics. The two windings are connected in parallel at the current terminals for large current capacity. Besides, the current terminals are at the ends of the coil so that the elec. insulation design may be easier than that of other non-inductive coils. The novel solenoid type bifilar coil for SFCL is fabricated with **BSCCO 2223** and tested in LN₂ bath at 77 K to investigate the current and voltage sharing as well as the current limiting effects. According to the test results, the current is limited effectively at first peak after the fault and the current sharing performance in each winding is verified under the normal and fault conditions. In order to compare with other bifilar coils, the AC losses are measured.

~1 Citing

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45. AC loss and thermal stability of HTS model coils for a 600 kJ SMES

By Park, Myung-Jin; Kwak, Sang-Yeop; Kim, Woo-Seok; Lee, Seung-Wook; Lee, Ji-Kwang; Han, Jin-Ho; Choi, Kyeong-Dal; Jung, Hyun-Kyo; Seong, Ki-Chul; Hahn, Song-yop
From [IEEE Transactions on Applied Superconductivity \(2007\), 17\(2, Pt. 2\), 2418-2421](#). Language: English, Database: CAPLUS, DOI:10.1109/TASC.2007.899107

A 600 kJ Superconducting Magnetic Energy Storage System (SMES) project with High Temp. Superconductor (HTS) started as a national project in Korea. The HTS model coils were designed and fabricated for a preliminary test prior to the creation of a full scale prototype. Single reinforced **BSCCO-2223** wires were used for the model coils and the operating temp. was decided to be 20K. Even though an SMES is not an AC-powered device, time-varying currents during the charging and discharging periods lead to the generation of time-variation magnetic fields applied to the model coils and the generation of AC loss. In this paper, AC loss and the temp. distribution of model coils are analyzed and discussed.

~4 Citings

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46. Low boil-off HTS current leads

By Lakrimi, M.; Brown, J.; Cetnik, P.; Wilkinson, M.; Clapton, D.; Fair, R.; Smith, K.; Noonan, P.
From [IEEE Transactions on Applied Superconductivity \(2007\), 17\(2, Pt. 2\), 2270-2273](#). Language: English, Database: CAPLUS, DOI:10.1109/TASC.2007.898102

HTS based leads have established themselves for high current carrying applications. This work revisits the issues for com. magnets with a view to minimizing heat load and space for both the resistive and HTS parts. The paper describes the exptl. work carried out to develop up to 300 A HTS current leads for Oxford Instruments' Cryofree and liq. helium cooled magnets. The current-voltage, temp., and quench measurements are reported. The leads make use of **BSCCO-2223** HTS wire and have been characterized at 4.2 K, 77 K, and some intermediate temps. for quench purposes to test their robustness. The leads are in thermal equil. with their environment and require no addnl. cooling, unlike in the case of large current leads for accelerator magnets. The current work on the combined resistive and HTS parts has achieved a boil-off of 20 mL/h in a liq. cooled cryostat.

~1 Citing

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47. Structural and physical properties of Nd substituted bismuth cuprates $\text{Bi}_{1.7}\text{Pb}_{0.3-x}\text{Nd}_x\text{Sr}_2\text{Ca}_3\text{Cu}_4\text{O}_{12+y}$

By Ozkurt, Berdan; Ekicibil, Ahmet; Ali Aksan, M.; Ozelik, Bekir; Yakinci, M. Eyuephan; Kiyimac, Kerim
From *Journal of Low Temperature Physics* (2007), 149(1/2), 105-118. Language: English, Database: CAPLUS,
DOI:10.1007/s10909-007-9500-0

BiPb_{-2234} bulk samples with nominal compn. of the compd. $\text{Bi}_{1.7}\text{Pb}_{0.3-x}\text{Nd}_x\text{Sr}_2\text{Ca}_3\text{Cu}_4\text{O}_{12+y}$ (**BSCCO**) ($0.025 \leq x \leq 0.10$) have been prep'd. by the melt-quenching method. The effects of Nd substitution on the **BSCCO** system have been investigated by elec. resistance (R-T), SEM, x-ray diffraction (XRD), and magnetic hysteresis measurements. It has been the **BSCCO** (2212) low- T_c phase is formed for all the substitution levels, together with the **BSCCO** (2223) high- T_c phase. The results obtained suggest that with increasing Nd^{3+} doping for Pb^{2+} the (2223) phase existing in undoped **BSCCO** gradually transforms into the (2212) phase and hence all of the samples have a mixed phase formation. The R-T result of the samples show two-step resistance transition; first transition occurs at 100 K and second in an interval of 80-90 K, depending on the Nd concn. We have found that the magnetization decreases with increasing temp. in agreement with the general characteristic of the high- T_c materials. The samples exhibit weak field dependence particularly after 2 T and changes on the magnetic hysteresis, M-H curve rather small compared to the conventional superconducting materials. The max. crit. c.d., J_c , value was calcd. to be 8.51×10^5 at 4.2 K and J_c decreases with increasing temp. and the substitution level.

~22 Citings

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48. Bismuth-based high-temperature superconducting wire, and its manufacture method

By Wang, Xiancheng; Zhao, Liang; Han, Zhenghe; Song, Xiuhua
From *Faming Zhuanli Shenqing* (2007), CN 1925066 A 20070307, Language: Chinese, Database: CAPLUS

The title superconducting wire comprises at least one superconducting core, and at least coating of metal, semiconductor, and/or org. resin. The title method comprises treating superconducting wire with $(\text{Bi,Pb})_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+x}$ (**BSCCO-2212**) phase as main phase at 810-850°C under oxygen partial pressure of 0.01-0.2 atm for 5-20 h to obtain superconducting wire contg. $(\text{Bi,Pb})_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{10+d}$ (**BSCCO-2223**) phase 40-80%, rolling or pressing to improve the texture of the superconducting core, treating at 800-840°C under oxygen partial pressure of 0.01-0.2 atm for 1-30 h to obtain superconducting wire contg. **BSCCO-2223** phase 70-95%, and post-annealing at 700-810°C under oxygen partial pressure of 0.01-0.2 atm for 1-20 h. The invention can greatly reduce time of heat treatment and lower the requirement for control precision of heat treatment.

~0 Citings

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49. Overview of fundamental study on remountable HTS magnet

By Ito, S.; Hashizume, H.
From *Fusion Engineering and Design* (2006), 81(20-22), 2527-2533. Language: English, Database: CAPLUS,
DOI:10.1016/j.fusengdes.2006.07.005

A remountable HTS (high temp. superconducting) magnet was proposed for one of the future designs of fusion reactors. It can facilitate the fabrication of the magnet itself and the replacement of failed parts and of the inner structural material components in the maintenance phase. The butt joint of HTS cable was investigated for the concept. At first, performance of the butt joint of **BSCCO 2223** tape was evaluated by expts. and numerical analyses to clarify the basic property of the butt joint. Then exptl. evaluation of the butt joint of laminated **BSCCO 2223** cable was carried out to prove robustness against heat generation at jointing parts at liq. nitrogen temp. and several hundred amperes. Based on the proof, the prototype of the remountable HTS magnet by using the butt joint was fabricated and the performance was evaluated to suggest some issues for the future development. The above fundamental studies on the remountable HTS magnet are summarized in this paper.

~15 Citings

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50. A solid-nitrogen cooled high-temperature superconducting magnet for use in magnetohydrodynamic marine propulsion

By Hales, Patrick; Hirst, Peter; Milward, Steven; Harrison, Stephen; Jones, Harry

From [IEEE Transactions on Applied Superconductivity](#) (2006), 16(2), 1419-1422. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2005.869554

A small high-temp. superconducting (HTS) magnet has been produced as part of a MHD (MHD) propulsion unit to power a model boat. The magnet is wound from 6 pancake coils of Bi-Sr-Ca-Cu-O HTS tape (**BSCCO-2223**), and is conduction cooled using an onboard "thermal battery", contg. 3 L of solid nitrogen. The magnet is racetrack shaped, and aluminum electrodes are placed along the straights of the magnet to pass an elec. current through the saltwater, perpendicular to the magnetic field. Power for the magnet and the electrodes is provided by onboard sealed lead acid batteries, resulting in a fully 'stand-alone' magnet system, capable of up to 1.25 h of continuous operation on one battery pack. This system was integrated into a model boat hull (approx. 1.2 m long x 0.6 m wide), which was successfully launched on 29th March 2004 at the Culham Science Center in Abingdon, England. A top speed of ~30 mm/s was reached during the first trial.

~3 Citings

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51. Design of HTS magnets for a 600 kJ SMES

By Kim, Woo-Seok; Kwak, Sang-Yeop; Lee, Ji-Kwang; Choi, Kyeong-Dal; Jung, Hyun-Kyo; Seong, Ki-Chul; Hahn, Song-yop

From [IEEE Transactions on Applied Superconductivity](#) (2006), 16(2), 620-623. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2005.864244

Development of a 600 kJ Superconducting Magnetic Energy Storage (SMES) system is in progress by Korean Elec. Research Institute (KERI). High-temp. superconducting (HTS) wires are going to be used for the winding of the system. The design of the HTS windings for the system is presented in this paper. We considered **BSCCO-2223** wire for the HTS windings. The operating temp. of the winding was decided to be 20 K which will be accomplished by conduction cooling method using cryo-coolers. Auto-Tuning Niching Genetic Algorithm was adopted for an optimization method of the HTS magnets in the SMES system. The objective function of the optimal process was minimizing the total amt. of the HTS wire. We also estd. the AC loss which can be generated in the discharge period. These HTS windings are going to be applied to the SMES system whose purpose is the stabilization of the power grid.

~14 Citings

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52. Design consideration of a high-temperature superconducting magnet for energy storage in an active power filter

By Chao, Chen; Grantham, Colin

From [IEEE Transactions on Applied Superconductivity](#) (2006), 16(2), 612-615. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2005.864923

Installing active power filters (sometimes called active harmonic filters or line conditioners) in an elec. power network can improve the quality of electricity supply. A shunt active power filter, with a current-source PWM inverter and a conventional copper inductor as its energy storage, has a significant power loss. The power loss in this copper inductor can be substantially reduced by replacing the inductor with a high-temp. superconducting (HTS) magnet. Several solenoid design alternatives using silver-sheathed **BSCCO-2223** tape have been made for the HTS magnet that has an inductance of 0.5 H for this application. A liq.-nitrogen-cooled HTS magnet has been built and tested for use in an active power filter. The loss-redn. effect of using the HTS magnet with the current-source active power filter has been investigated exptl., and the results are compared with those when using a conventional copper inductor. Practical issues such as air-core design vs. iron-core design and using liq.-nitrogen cooling or a cryocooling are analyzed and discussed.

~0 Citings

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53. Study on joint properties of Bi-2223/Ag Tape

By Zhang, Hong-Jie; Zong, Jun; Wang, Su-Li; Li, Qing-Fu

From [Diwen Wuli Xuebao](#) (2006), 28(3), 275-279. Language: Chinese, Database: CAPLUS

Long lengths of **BSCCO-2223**/Ag tape with high performance are more difficult to fabricate than shorter lengths. In some com. application, different superconducting components must be jointed. Jointing technique must be reliable and elec. efficient. Splicing of **Bi-2223**/Ag tape by soldering should be performed in a way leaving the splice with elec. properties just as good compared with unspliced tape. This paper studies on the factors influencing the resistance in the joint. The finite element method was used to calc. the joint resistance and the crit. current of the joint. The criterion to decrease the soldering resistance are summed up and the results are confirmed by expts.

~0 Citings

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54. HTS and NMR/MRI magnets: Unique features, opportunities, and challenges

By Iwasa, Yukikazu

From [Physica C: Superconductivity and Its Applications](#) (Amsterdam, Netherlands) (2006), 445-448, 1088-1094.

Language: English, Database: CAPLUS, DOI:10.1016/j.physc.2006.05.040

A review. The unique features of HTS offer opportunities and challenges to a no. of applications. In this paper it is focussed on NMR and MRI magnets and present a brief description of some of the NMR/MRI magnet programs at FBML that are currently on-going and expected to begin in the near future, specifically a 1 GHz NMR magnet comprising an LTS magnet and an HTS insert wound with **BSCCO-2223** tape, an NMR magnet assembled from YBCO annuli, and an MRI "demonstration" magnet wound with MgB_2 wire. Two conclusions are presented for HTS as applied to NMR/MRI magnets: (i) impact of HTS on NMR/MRI magnet technol. is great, because HTS offers many opportunities and challenges, some of which are described here; and (ii) impact of NMR/MRI magnets on HTS manufacturers is mixed-for high-field NMR magnet, it is small because the required amt. of HTS in these magnets is negligible compared with that in elec. power applications; for "low-field" NMR magnets, it may be potentially large if MgB_2 replaces Nb-Ti and Nb_3Sn ; and for MRI magnets, it is potentially huge if MgB_2 replaces Nb-Ti and Nb_3Sn .

~18 Citings

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55. The influence of bending strains on AC power losses in multifilamentary **BSCCO-2223**/Ag tapes

By Tsukamoto, O.; Ciszek, M.; Suzuki, H.; Ogawa, J.

From [Superconductor Science and Technology](#) (2006), 19(8), 792-796. Language: English, Database: CAPLUS, DOI:10.1088/0953-2048/19/8/017

Recent advances in the manufg. of multifilamentary high temp. superconducting composite wires allow for wider practical applications of the conductors, e.g. in power transmission cables, transformers and motors. The wires, based mainly on **BSCCO-2223** and YBCO-123 cuprates, are used in the forms of variously shaped coils; therefore they are subjected to different kinds of mech. stresses and strains. These, in turn, lead to some changes in the phys. parameters of the superconducting material, mainly in the crit. c.d., and thus in the dissipated electromagnetic energy, when subjected to changing magnetic fields and transport currents. In this work we report some exptl. results related to the AC loss characteristics of **Bi-2223**/Ag multifilamentary tapes and their dependences on bending strains. These losses are compared to the losses of virgin, straight tapes. The total AC losses, i.e. transport current and magnetization losses, in the **Bi-2223**/Ag tapes, were measured by means of the elec. and calorimetric methods. The exptl. data obtained are compared with the crit. state model predictions for AC loss behavior in the exptl. conditions presented here.

~1 Citing

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56. Conduction-cooling of a high-temperature superconducting cable

By Posada, Alberto; Manousiouthakis, Vasilios

From [AIChE Annual Meeting, Conference Proceedings](#), Cincinnati, OH, United States, Oct. 30-Nov. 4, 2005 (2005), 71f/1-71f/12. Language: English, Database: CAPLUS

Current generation high-temp.-superconducting (HTS) power transmission cables use liq. N as a coolant that circulates along the cable. The use of axial conduction-cooling in attaining HTS temps. in transmission lines is proposed. Liq. coolant use is envisioned only at periodic length intervals along the transmission lines, in combination with insulation and Cu. The proposed concept is feasible due to the high thermal cond. of pure Cu at cryogenic temps. A basic design for the insulated cable is proposed and a detailed numerical simulation of heat transfer in such a cable is carried out for various case studies considering the superconducting materials MgB_2 and **BSCCO-2223**.

~0 Citings

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57. High temperature superconductors for high field superconducting magnets

By Barzi, E.; Del Frate, L.; Turrioni, D.; Johnson, R.; Kuchnir, M.

From [AIP Conference Proceedings \(2006\)](#), 824(Advances in Cryogenic Engineering, Volume 52B), 416-424.

Language: English, Database: CAPLUS

Ionization cooling, a method for shrinking the size of a muon beam, requires a low Z energy absorber, high field magnets, and high gradient radio frequency cavities. The use of high temp. superconductors (HTS) for the high field superconducting magnets is being considered to realize a helical muon cooling channel using H refrigeration. A test stand was set up at Fermilab to perform crit. current (I_c) measurements of HTS wires under externally applied perpendicular and parallel fields at various temps. A description of the test setup and results on $(\text{Bi,Pb})_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_x$ (BSCCO-2223) tapes and $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_8$ (BSCCO-2212) round wires are presented. Finally, the engineering crit. c.d., J_E , of HTS and Nb_3Sn were compared in the application's field and temp. range of interest.

~2 Citings

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58. On conduction-cooling of a high-temperature superconducting cable

By Posada, Alberto; Kim, Young I.; Manousiouthakis, Vasilios

From [Cryogenics \(2006\)](#), 46(6), 458-467. Language: English, Database: CAPLUS,

DOI:10.1016/j.cryogenics.2006.02.003

Current generation high-temp. superconducting (HTS) power transmission cables use liq. N_2 as a coolant that circulates along the cable. The use of axial conduction-cooling in attaining HTS temps. in transmission lines is proposed. Liq. coolant use is envisioned only at periodic length intervals along the transmission lines, in combination with insulation and Cu. The proposed concept is feasible due to the high thermal cond. of pure Cu at cryogenic temps. A basic design for the insulated cable is proposed and a detailed numerical simulation of heat transfer in such a cable is carried out for various case studies considering the superconducting materials MgB_2 and BSCCO-2223.

~2 Citings

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59. Butt jointing performance for remountable HTS magnet by improving contact surface condition

By Ito, S.; Hashizume, H.; Yuki, K.; Takami, S.; Yamamoto, Y.

From [Fusion Engineering and Design \(2006\)](#), 81(8-14), 1491-1496. Language: English, Database: CAPLUS,

DOI:10.1016/j.fusengdes.2005.08.062

The remountable HTS magnet, which can facilitate the fabrication of the magnet itself and the replacement of failed parts and of inner structural component, was proposed by the authors, esp. for helical reactors and Spherical Tokamak. Through the previous researches, it has been clarified that the butt joint of HTS cable is a suitable joint method for the remountable magnet. In this study, the butt jointing performance of BSCCO 2223 cable is evaluated when the contact surface is metal-electroplated or coated with nano-carbon particles. The results show that electroplating of silver can reduce the joint resistance. The joint resistance obtained by this expt. is small enough to prevent significant resistance increase below 500 A. It is proved that the HTS cable has enough robustness against heat generation in the butt joint under liq. nitrogen temp. below 500 A, which shows future feasibility of the remountable HTS magnet.

~3 Citings

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60. Magnetic field dependence of kinetic inductance in $\text{Bi}_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{10}$ superconducting strip and its feasible applications

By Sarangi, S.; Chockalingam, S. P.; Bhat, S. V.

From [Los Alamos National Laboratory, Preprint Archive, Condensed Matter \(2005\)](#), 1-19, arXiv:cond-mat/0511705.

Language: English, Database: CAPLUS

The kinetic inductance properties of a thin superconducting sample of **BSCCO-2223** compd. is studied. A strong dependence of kinetic inductance with the variation of applied magnetic field is found at low temp. in the superconducting state. The kinetic inductance of a thin superconductor increases linearly with increasing magnetic field. This behavior is used for designing a superconducting modulator circuit. This behavior can be useful for device applications and designing of superconducting electronic circuits like superconducting power amplifier, superconducting transmitter and superconducting a.c. current controller.

~0 Citings

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61. AC loss in granular superconducting MgB₂ at radio frequencies

By Sarangi, S.; Chockalingam, S. P.; Bhat, S. V.

From [Los Alamos National Laboratory, Preprint Archive, Condensed Matter \(2005\)](#), 1-15, arXiv:cond-mat/0511703.

Language: English, Database: CAPLUS

AC losses of granular superconducting MgB₂ were measured using nonresonant radiofrequency power absorption techniques. The presence of 2 band-gaps makes the temp. dependent a.c. loss pattern of MgB₂ different from other high T_c superconductors like YBa₂Cu₃O and **BSCCO-2223**. Josephson junction decoupling plays a major role in MgB₂ polycryst. samples, both in the presence and absence of magnetic field. The authors studied the a.c. loss of MgB₂ samples with different cryst. properties, grain sizes and pressures and sintered under different phys. and chem. conditions. The effects of frequency and amplitude of a.c. current on the a.c. loss are discussed.

~0 Citings

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62. Preparation of Bi-2223/Ag tapes with pre-annealed precursor powders

By Jiang, C. H.; Kumakura, H.

From [Physica C: Superconductivity and Its Applications \(Amsterdam, Netherlands\) \(2005\)](#), 426-431(Pt. 2), 1138-1142.

Language: English, Database: CAPLUS, DOI:10.1016/j.physc.2005.01.063

Several kinds of precursor powders with varied phase assemblages were prepd. by pre-annealing the com. **BSCCO 2223** powders in pure Ar, O₂ or mixed gas (7.5% O₂ + 92.5% Ar) at elevated temps., and then were made into monofilament Bi-2223/Ag tapes. Annealing the powders in pure Ar at 700 °C for 10 h greatly retarded the 2223 phase formation at the initial reaction stage, consequently lowered the J_c value of the fully processed Bi-2223/Ag tapes. The sample fabricated by using the precursor powder pre-annealed in 7.5% O₂ showed the best J_c property (25 kA/cm², 77 K, 0 T). The microstructures of the samples made from various precursor powders were examd., which were correlated to their different phase formation behaviors and transport properties.

~3 Citings

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63. Fatigue behavior of multifilamentary **BSCCO 2223** superconducting tapes

By Salazar, A.; Pastor, J. Y.; Llorca, J.

From [Boletin de la Sociedad Espanola de Ceramica y Vidrio \(2005\)](#), 44(4), 204-205. Language: Spanish, Database: CAPLUS

Mech. properties and the crit. current were studied in three com. multi-filamentary **BSCCO 2223** tapes (formed by Bi₂Sr₂Ca₂Cu₃O_{10+x} high-temp. ceramic superconductors embedded in a Ag-Mg alloy) subjected to monotonic and fatigue tension at 77 K in the longitudinal direction. The elec. transport properties were found not to be affected under monotonically growing tensions if the max. tensile stress remained below the conventional 0.2% yield strength. This magnitude was reduced by 10%-20% in the case of fatigue loading, and the service life of the tape was controlled by the mech. fatigue life.

~0 Citings

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64. Critical current degradation in HTS wires due to cyclic mechanical strain

By Ryan, David T.; Li, Liang; Huang, Xianrui; Bray, J. W.; Laskaris, Evangelos T.; Sivasubramaniam, Kiruba; Gadre, Aniruddha D.; Fogarty, James M.; Harley, E. J.; Otto, A.; et al
From [IEEE Transactions on Applied Superconductivity](#) (2005), 15(2, Pt. 3), 3684-3687. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2005.849392

HTS wires, which may be used in many devices such as magnets and rotating machines, may be subjected to mech. strains from electromagnetic, thermal and centripetal forces. In some applications, these strains will be repeated several thousand times during the lifetime of the device. The authors measured crit. current degrdn. due to repeated strain cycles for both compressive and tensile strains. Results for **BSCCO-2223** HTS conductor samples are presented for strain values up to 0.5% and cycle nos. up to and beyond 10^4 .

~1 Citing

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65. Analysis of coupling losses in multifilamentary untwisted **BSCCO/Ag** tapes through a.c. susceptibility measurements

By Zola, Danilo; Gomory, Fedor; Polichetti, Massimiliano; Strycek, Frantisek; Souc, Jan; Kovac, Pavol; Pace, Sandro
From [IEEE Transactions on Applied Superconductivity](#) (2005), 15(2, Pt. 3), 2903-2906. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2005.848629

Losses as a function of the a.c. magnetic field amplitude (B_0) were evaluated at 77 K in untwisted **BSCCO(2223)/Ag** tapes, at different frequencies, by measuring the imaginary part of a.c. magnetic susceptibility. In particular, the measurements were performed on different portions of the same tape, obtained by cutting it in pieces with different length, starting from around 120 approx. mm down to 10 approx. mm. The losses depend on the sample length, but this obsd. behavior can not be always ascribed to the coupling mechanism among filaments. The authors discuss the obsd. exptl. behavior for different typologies of tapes. The data are analyzed by comparing them with the results obtained by anal. models allowing the authors to characterize the tapes with respect to the coupling mechanisms.

~3 Citings

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66. Synthesis and characterization of fine and homogeneous **BSCCO-2223** precursor powder by spray pyrolysis process for powder-in-tube (PIT) process

By Yoo, Jaimoo; Ko, Jae-Woong; Kim, Young-Kuk; Chung, Kook-Chae
From [IEEE Transactions on Applied Superconductivity](#) (2005), 15(2, Pt. 3), 2474-2477. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2005.847489

Homogeneous and fine **BSCCO** precursor powders were prepd. by spray pyrolysis (SP) method starting from an aq. soln. of metal nitrates. The influence of soln. concn., furnace reaction temp. and types of spray on microstructure and av. particle size were studied. The synthesized precursor powders had a narrow particle size distribution and low C content. The reactivity of precursor powder by SP method is very high, attributed to the fine and narrow particle size distribution of precursor powders. The precursor powder by SP method promoted a very quick formation of the **2223** phase for short sintering time. The XRD result shows high possibility of reducing secondary phases such as large AEC and almost phase pure microstructure through more homogeneous reaction.

~3 Citings

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67. Equal current distribution in parallel circuits of resistive superconducting fault current limiters using multiple superconducting inter-phase transformers

By Sim, Jungwook; Choi, Yong-Sun; Kim, Hye-Rim; Hyun, Ok-Bae
From [IEEE Transactions on Applied Superconductivity](#) (2005), 15(2, Pt. 2), 2122-2125. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2005.849467

Differences in impedances of the superconducting parallel circuits during normal operations cause unequal distribution of currents in the circuits, resulting in quench or loss in certain superconducting parts. However, those impedances are so small that they are hardly controllable. To solve this problem, attempted were such measures as inserting resistors or inductors into each of the parallel circuits in series. This leaves extra losses due to resistance or reactance. In this study, we proposed a multiple superconducting inter-phase-transformers (SIPT) for the equal current distribution in superconducting parallel circuits and investigated their performance. SIPTs were fabricated using double pancake windings of **BSCCO-2223** HTS tapes and were applied to parallel circuits of resistive superconducting fault current limiters (SFCLs). Results showed that the SIPTs effectively made the current distribution uniform in superconducting parallel circuits that had unequal resistances. In addn., the secondary loop configuration with air-core SIPTs was suggested as the most efficient for the SFCLs.

~1 Citing

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68. Tests of tri-axial HTS cables

By Gouge, M. J.; Lindsay, D. T.; Demko, J. A.; Duckworth, R. C.; Ellis, A. R.; Fisher, P. W.; James, D. R.; Lue, J. W.; Roden, M. L.; Sauers, I.; et al
From [IEEE Transactions on Applied Superconductivity](#) (2005), 15(2, Pt. 2), 1827-1830. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2005.849304

The Ultera/ORNL (Oak Ridge National Lab.) team built and tested 3-m and 5-m triaxial cables rated at 3 and 1.3 kA-rms, resp. The 3 concentric superconducting phases are made of **BSCCO-2223** HTS tapes, sepd. by layers of cold-dielec. tapes. A Cu braid is added as the grounding shield on the outside of the 3 active phases. Tests of these cables were performed at 70-84 K. A.c. loss data re-confirmed the previous result on a 1.5-m prototype cable that the total 3-phase a.c. loss is about the sum of the calcd. a.c. losses of the 3 concentric phases. These and other test results of the 1.3 and 3 kA cables will be used to construct a second 5-m triaxial cable rated at 3 kA-rms, 15 kV. Preliminary test results supporting this new cable and the assocd. termination are summarized.

~14 Citings

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69. Introduction of China's first live grid installed HTS power cable system

By Xin, Ying; Hou, Bo; Bi, Yanfang; Xi, Haixia; Zhang, Yong; Ren, Anlin; Yang, Xicheng; Han, Zhenghe; Wu, Songtao; Ding, Huaikuang
From [IEEE Transactions on Applied Superconductivity](#) (2005), 15(2, Pt. 2), 1814-1817. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2005.849299

China's first HTS power cable project was started in the second half of 2002 and on site system installation was finished at Puji Substation of China Southern Power Grid in Mar., 2004. This cable system consists of three 33.5 m, 35 kV/2 kA_{rms} cables, six terminations, and a closed cycle liq. nitrogen cooling station. The conductors of the cables were made of 4 layers of **BSCCO 2223** HTS tapes. Off grid field testing and live grid trial operation has been carried out since the completion of the installation. In this paper, we will report the key tech. parameters of the system. Descriptions of the installation site, demonstration of the system installation, and results of testing and trial operation will also be presented and discussed.

~16 Citings

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70. Design and test results of a **BSCCO-2223 magnet for gyrotron application**

By McGhee, R. Wayne; Burkhardt, Earle E.; Berryhill, Adam; Coffey, D. Michael
From [IEEE Transactions on Applied Superconductivity](#) (2005), 15(2, Pt. 2), 1189-1191. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2005.849529

A program is currently under way to develop a compact, power-efficient, robust gyrotron. Gyrotrons require a very precise magnetic field, typically generated by a NbTi superconducting magnet, to form the environment necessary for the microwave power generation. The use of high-temp. superconductor (HTS) material for a liq. cryogen-free gyrotron magnet will significantly reduce the input power requirements for the cryocooler compressor and the overall size of the magnet system. Cryomagnetics has designed, built and successfully tested a magnet wound with **BSCCO-2223** tape to be used in the gyrotron. The HTS magnet was designed such that it can replace the current LTS (NbTi) cryogen-free gyrotron magnet in form, fit and function. The HTS magnet consists of 11 double-pancakes and provides stable 3.57 T operation at 37 K with a current of 120 A. Magnetic field shape, which is extremely important in gyrotron applications, was a considerable challenge since NbTi operating at 4.2 K is capable of a much higher c.d. than **BSCCO** operating at 37 K. Overall refrigeration requirements were reduced from ~8 kW in the LTS system to ~4 kW in the HTS system. A single-stage GM cryocooler was used to cool the HTS magnet. Comprehensive tests of the HTS magnet, including operation with the gyrotron tube, have been successfully completed.

~4 Citings

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71. SEM investigation of the critical current degradation onset in **BSCCO-2223 multifilamentary tapes submitted to bending**

By Malachevsky, Maria Teresa; D'Ovidio, Claudio Alberto

From [Superconductor Science and Technology](#) (2005), 18(3), 289-293. Language: English, Database: CAPLUS, DOI:10.1088/0953-2048/18/3/014

The applicability of superconducting tapes is evaluated employing the definition of an irreversibility strain ϵ_{irr} , attained at a crit. c.d. J_c of 98% of its initial value. Before reaching this limit, the J_c decreases slowly. In order to det. the microstructural changes responsible for this behavior, we investigated the mech. response of 19-filament BSSCCO-Ag tapes with different ceramic microstructures, when bent without exceeding ϵ_{irr} . After chem. removing a rectangular-shaped area of the silver sheath to expose the ceramic filaments, the samples were subjected to three-point bending inside an SEM chamber. Thus, we were able to follow the microstructural changes produced by the formation and propagation of cracks at the same time that we recorded on a PC the force vs. deflection curves. We identified three different regions representing the response of the tapes to increasing bending. After the elastic region, the pre-existing microstructural faults detd. the plastic behavior. At higher deflections, we measured several stress drops coincident with the observation of micro-cracks that grew slowly across the filaments. Twin samples were employed to control the crit. c.d. decay as a function of the bending deflection introduced at ambient temp. We investigated the correlation between the bending induced defects and the crit. current degn.

~18 Citings

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72. Industrial HTS conductors: status and applications

By Masur, L. J.; Kellers, J.; Kalsi, S.; Thieme, C.; Harley, E.

From [Institute of Physics Conference Series](#) (2004), 181(Applied Superconductivity 2003), 219-227. Language: English, Database: CAPLUS

A review. First generation (1G) multifilamentary composite wire made from the high temp. superconductor **BSCCO-2223**, manufd. com. by American Superconductor (AMSC), is able to carry more than 140-times the elec. current of copper wire of the same cross section, and is robust enough to meet com. requirements. 1G wire has matured into distinct products which can now be tailored to meet the unique requirements of specific applications. This paper will report on the performance and reliability testing of these HTS products. Furthermore, we will provide a brief overview of recent results obtained with second generation (2G) coated conductor composite wire, which is in development and has demonstrated uniform and reproducible performance of greater than 100 A/cm at 77 K over 10 m lengths. 1G HTS wire has already been used in a no. of advanced prototype devices in the fields of motors, generators, power cables, and electro-magnets. This paper will report on the most significant uses of HTS technol. in motors for ship propulsion, including an update on the 5 MW and 36.5 MW HTS ship propulsion motors that American Superconductor is providing to the U.S. Navy. These contracts are important steps toward the commercialization of HTS rotating machinery.

~2 Citings

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73. Magnetic relaxation of type-II superconductors in a mixed state of entrapped and shielded flux

By Zola, D.; Polichetti, M.; Senatore, C.; Pace, S.

From [Physical Review B: Condensed Matter and Materials Physics](#) (2004), 70(22), 224504/1-224504/9. Language: English, Database: CAPLUS, DOI:10.1103/PhysRevB.70.224504

The magnetic relaxation has been investigated in type-II superconductors when the initial magnetic state is realized with entrapped and shielded flux contemporarily. This flux state is produced by an inversion in the magnetic field ramp rate due to, for example, a magnetic field overshoot or undershoot. The investigation has been faced both numerically and by measuring the magnetic relaxation in **BSCCO** tapes. Numerical computations have been performed in the case of an infinite thick strip and of an infinite slab, showing a quickly relaxing magnetization in the first seconds. As verified exptl., the effects of the overshoot (or the undershoot) cannot be neglected simply by cutting the first 10-100 s in the magnetic relaxation. On the other hand, at very long times, the magnetic states relax toward those corresponding to field profiles with only shielded flux or only entrapped flux, depending on the amplitude of the field change with respect to the full penetration field of the considered superconducting samples. In addn., we have performed numerical simulations in order to reproduce the relaxation curves measured on the **BSCCO(2223)** tapes; this allowed us to interpret correctly also the first seconds of the $M(t)$ curves.

~4 Citings

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74. Analysis of coupling losses in multifilamentary untwisted **BSCCO/Ag** tapes through a.c. susceptibility measurements

By Zola, D.; Goemoery, F.; Polichetti, M.; Strycek, F.; Souc, J.; Kovak, P.; Pace, S.

From [Los Alamos National Laboratory, Preprint Archive, Condensed Matter \(2004\), 1-4, arXiv:cond-mat/0410548](#).

Language: English, Database: CAPLUS

Losses as function of the a.c. magnetic field amplitude (B_0) were measured at 77 K in untwisted **BSCCO(2223)/Ag** tapes, at different frequencies, by measuring the imaginary part of the a.c. susceptibility. In particular, loss measurements were performed in the portions of the same tape, obtained by cutting it in pieces with different length, starting from around 12 cm down to 1 cm. The measured losses depend on the sample length but this obsd. behavior is not always due to the coupling mechanism among the filaments. The authors discuss the obsd. exptl. behavior of different typol. of tapes by analyzing data comparing them with anal. models to fully characterize the tapes with regard to the coupling mechanism.

~0 Citings

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75. Two demonstrations on superconductivity

By Kraftmakher, Yaakov

From [European Journal of Physics \(2004\), 25\(5\), 689-694](#). Language: English, Database: CAPLUS,

DOI:10.1088/0143-0807/25/5/011

Two demonstrations on supercond. are described. In the first demonstration, the V-I curve of a short-circuited $\text{Bi}_{2-x}\text{Pb}_x\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{10}$ (**BSCCO-2223**) ring at 77 K and the crit. current are obsd. In the second demonstration, the phase transition from the superconducting to the normal state of a **BSCCO-2223** sample is obsd. through the change of its magnetic susceptibility. Both basic features of supercond., the zero elec. resistance and the diamagnetic properties, are thus shown. The demonstrations may become a useful addn. to those described earlier and can be developed into lab. expts.

~0 Citings

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76. Fatigue behavior of multifilamentary **BSCCO 2223/Ag** superconducting tapes

By Salazar, Alicia; Pastor, Jose Ygnacio; Llorca, Javier

From [IEEE Transactions on Applied Superconductivity \(2004\), 14\(3\), 1941-1947](#). Language: English, Database:

CAPLUS, DOI:10.1109/TASC.2004.830606

The mech. properties and the crit. current were studied in three com. multifilamentary $\text{Bi}_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{10+x}/\text{Ag}$ tapes subjected to monotonic and fatigue tension at 77 K in the longitudinal direction. It was found that transport properties were not compromised under monotonic tension if the max. tensile stress remained below the conventional 0.2% yield strength. This magnitude was reduced by 10% to 20% in the case of fatigue loading, and the service life of the tape was dictated by the mech. fatigue life.

~11 Citings

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77. The fabrication of fine and homogenous **Bi-2223** precursor powder by a spray pyrolysis process

By Yoo, Jaimoo; Kim, Sunghwan; Ko, Jae-Woong; Kim, Young-Kuk

From [Superconductor Science and Technology \(2004\), 17\(9\), S538-S542](#). Language: English, Database: CAPLUS,

DOI:10.1088/0953-2048/17/9/016

Spherical and fine **BSCCO** precursor powders were prepd. by an ultrasonic spray pyrolysis (SP) method from an aq. soln. of metal nitrates. The synthesized precursor powders had a narrow particle size distribution and a low carbon content of less than 80 ppm. The reactivity of the precursor powder made by the SP method is very high; this is attributed to the fine particle size and narrow size distribution of the precursor powders. The precursor powder made by the SP method promoted a very quick formation of the **BSCCO 2223** phase for short sintering times, while the secondary phases such as large alk. earth cuprates and Ca_2PbO_4 were minimized for SP tapes.

~7 Citings

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78. Development and characteristics of persistent mode in HTS magnet

By Kim, Jung Ho; Lim, Jun Hyung; Joo, Jinho; Choi, Seyong; Lee, Se-Hee; Nah, Wansoo; Kang, Hyoungku; Ko, Tae Kuk

From [Physica C: Superconductivity and Its Applications \(Amsterdam, Netherlands\) \(2004\), 412-414\(Pt. 2\), 1026-1029](#).
Language: English, Database: CAPLUS, DOI:10.1016/j.physc.2004.01.124

The authors fabricated a high-temp. superconducting (HTS) magnet with a persistent current switch (PCS) and evaluated the decay characteristics of persistent mode and joint resistance at 77 K. To make the HTS magnet, **BSCCO(2223)** tapes were wound into a double-pancake coil and connected to the PCS by soldering. Field decay behavior was remarkably dependent on operating current. At an operating current of 50% of the crit. current (I_c), decay behavior showed 2 distinct regimes: initial fast decay and subsequent linear decay. By contrast, there was a linear decay regime of only 13% of I_c . Total circuit resistance was $\sim 2.0 \times 10^{-8} \Omega$ at an operating current of 6 A. Measured decay behavior was closely consistent with the calcd. decay behavior obtained from both the index resistance and joint resistance components.

~3 Citings

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79. Low field vortex dynamics of **BSCCO-2223** superconducting thin films

By Martinez, H.; Marino, A.; Rodriguez, J. E.

From [Physica C: Superconductivity and Its Applications \(Amsterdam, Netherlands\) \(2004\), 408-410, 568-570](#).

Language: English, Database: CAPLUS, DOI:10.1016/j.physc.2004.03.030

Highly oriented **BSCCO** thin films were produced by r.f. magnetron sputtering on MgO(1 0 0) substrates. The magnetic properties of these single high T_c -phase with different granularity were analyzed in the low magnetic field region $0 < H < 0.08$ T. The $T_{irr}(H)$ data for all the samples fitted well to a de Almeida-Thoules (AT)-like power law. On the other hand the irreversibility line (IL) was shifted to lower temps. and both crit. c.d. and activation energy decreased by reducing the grain sizes.

~7 Citings

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80. Bose-glass transition in Ag/**BSCCO-2223** irradiated tapes

By Botta, D.; Chiodoni, A.; Gerbaldo, R.; Ghigo, G.; Gozzelino, L.; Laviano, F.; Minetti, B.; Mezzetti, E.

From [Physica C: Superconductivity and Its Applications \(Amsterdam, Netherlands\) \(2004\), 408-410, 32-33](#). Language: English, Database: CAPLUS, DOI:10.1016/j.physc.2004.02.024

In this work we show how strongly the interaction between pancakes in the ab-planes and Josephson vortices (JVs) across them is affected by columnar defect (CD) implantation, due to heavy-ion irradiation. By means of the irreversibility temps., obtained by the onset of the third harmonic of the a.c. susceptibility, the Bose-glass transition is put in evidence. This transition is limited in phase space size by the JV d., modulated by increasing the in-plane component of the applied field, in Ag/**BSCCO-2223** tapes irradiated with 0.25 GeV Au-ions producing CDs reaching the 15% of the depth of the tape.

~1 Citing

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81. Tri-axial cable terminations for 1.3- and 3-kA HTS cables

By Fisher, P. W.; Cole, M. J.; Demko, J. A.; Gouge, M. J.; Lindsay, D. T.; Lue, J. W.; Qualls, A. L.; Roden, M. L.; Tolbert, J. C.

From [AIP Conference Proceedings \(2004\), 710\(Advances in Cryogenic Engineering\), 892-898](#). Language: English, Database: CAPLUS

The Southwire/ORNL team has conceived, designed, built, and tested a 5-m, three-phase, tri-axial cable with terminations. The cable has three concentric superconducting phases made of **BSCCO-2223** HTS tapes, sep'd. by layers of cold-dielec. tape with a Cu braid as the grounding shield. The cable is enclosed in a flexible cryostat. Cooling of the cable and terminations is achieved by liq. N flowing through the annulus between the cable and the cryostat. A challenging anal. and design issue was development and implementation of an insulator material between the concentric phases with high enough thermal cond. to meet temp. gradient requirements and acceptable mech. and elec. performance. The resulting 3-phase, cold dielec., cable and termination design is nearly as compact as the single-phase, co-axial design developed previously by Southwire/ORNL, and it represents the highest cable c.d. achievable in an elec. a.c. power cable. This paper presents results from operation of the 1.3-kA root-mean-square phase current termination and design changes required to scale to 3-kA root-mean-square phase current.

~0 Citings

82. Tests of 5-M long triaxial HTS cables

By Lue, J. W.; Demko, J. A.; Fisher, P. W.; Duckworth, R. C.; Gouge, M. J.; Tolbert, J. C.; Roden, M. L.; Lindsay, D. T.
From [AIP Conference Proceedings \(2004\)](#), 710([Advances in Cryogenic Engineering](#)), 877-884. Language: English,
Database: CAPLUS

Following the pos. results of a 1.5 m long prototype cable, the Ultera and Oak Ridge National Lab. (ORNL) team built and tested a 5-m triaxial cable rated at 1.3 kA root-mean-square, 15 kV a.c. The three concentric superconducting phases are made of **BSCCO-2223** high-temp. superconducting (HTS) tapes, sepd. by layers of cold-dielec. tapes. A Cu braid is added as the grounding shield on the outside of the three active phases. To facilitate the calorimetric a.c. loss measurement, the cable was cooled by liq. N flowing in the annulus between the cable and the cryostat only. Tests of this cable were performed at 76-84 K. A.c. loss data reconfirmed the previous gratifying result on the 1.5 m prototype cable that the total three-phase loss is approx. the sum of the calcd. a.c. losses of the three sep. phases. No addnl. loss is due to possible coupling among the three phases. This and other test results of the 5 m, 1.3 kA triaxial cable are reported here. The next step in the project is to build and install a triaxial cable rated at 3-kA root-mean-square, 13 kV a.c. at a utility site. A single-phase 3 kA cable prototype was also built and tested for use as the most demanding inner phase of the triaxial cable.

~0 Citings

83. Burnout test of first- and second-generation HTS tapes in liquid-nitrogen bath cooling

By Young, M. A.; Demko, J. A.; Duckworth, R. C.; Lue, J. W.; Gouge, M. J.; Pace, M. O.
From [AIP Conference Proceedings \(2004\)](#), 711([Advances in Cryogenic Engineering](#)), 860-867. Language: English,
Database: CAPLUS

A series of **BSCCO-2223** and YBCO tapes were subjected to burnout tests in a liq.-nitrogen bath to observe operational stability limits when different layers of dielec. tape are added to the sample surface. In this study, the **BSCCO** tapes were composed of a silver/alloy sheath with nickel/copper plating, while the YBCO tapes had a 50- μ m layer of copper attached to the silver surface. After attaching the tapes to a thermally insulated G-10 holder, the stability of the tapes was found by applying current greater than the crit. current and holding it const. for up to 1 min. If the sample voltage increased rapidly during this period, the tape was considered unstable at this current. This was repeated at different layers of Cryoflex, and the results were compared to a numerical simulation of the energy balance equation. This simulation was also utilized to investigate the effect of the layers on the stability limit and est. the thermal cond. of the Cryoflex.

~0 Citings

84. Enhancement of the performances of Ag/**BSCCO-2223** tapes by heavy-ion irradiation

By Gerbaldo, R.; Botta, D.; Chiodoni, A.; Ghigo, G.; Gozzelino, L.; Laviano, F.; Minetti, B.; Amato, A.; Rovelli, A.; Mezzetti, E.
From [AIP Conference Proceedings \(2004\)](#), 711([Advances in Cryogenic Engineering](#)), 620-626. Language: English,
Database: CAPLUS

We report on results obtained by implanting columnar tracks, induced by 0.25 GeV gold ion irradiation, over about 15% of the sample thickness ("cut tracks"), on a high-quality monofilamentary Ag/**BSCCO-2223** tape. The angular dependence of the irreversibility temp. was measured by detg. the onset of the third harmonic of ac susceptibility. The results indicated a Bose-glass-like transition [Mezzetti, E. et al., *Phys. Rev. B* 59, 3890 (1999)]. Moreover, this angular dependence clearly indicates that the "cut tracks" in bulk samples, where they are competing with a lot of disorder and magnetic granularity, are effective and remain effective to localize pancake vortices up to "trapping angles" comparable with those obsd. for single crystals.

~0 Citings

85. The stability range of lead oxide compounds in **BSCCO-2223** precursor powders

By Li, M. Y.; Chen, X. P.; Qu, T. M.; Liu, Q.; Han, Z.

From [Physica C: Superconductivity and Its Applications](#) (Amsterdam, Netherlands) (2004), 411(1-2), 35-40. Language: English, Database: CAPLUS, DOI:10.1016/j.physc.2004.06.004

The stability range of lead oxide compds. $\text{Pb}_3\text{Sr}_{2.5}\text{Bi}_{0.5}\text{Ca}_2\text{CuO}_y$ (3321) phase and Ca_2PbO_4 phase in **BSCCO** materials has been investigated. In this study $(\text{Bi,Pb})_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_x$ (**BSCCO**) materials were heat treated in different oxygen partial pressures range from 1.0% O_2 to 20.8% O_2 . The formation and decompn. of lead oxide compds. were detd. by oxygen absorption and release processes, which were monitored with an oxygen analyzer. The phase compn. was detd. by X-ray diffraction. Exptl. results show that the stability range of lead oxide compds. depends on the temp. and the oxygen partial pressure during heat treatment. Increasing oxygen partial pressure broadens the temp. range of the stable range of the 3321 phase, whereas the formation temp. of the 3321 phase remains at about 590 °C. Ca_2PbO_4 phase is more stable at higher temp. compared with the 3321 phase.

~4 Citings

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86. Magnetic relaxation of type II superconductors in a mixed state of entrapped and shielded flux

By Zola, D.; Polichetti, M.; Senatore, C.; Pace, S.

From [Los Alamos National Laboratory, Preprint Archive, Condensed Matter](#) (2004), 1-9, arXiv:cond-mat/0408045. Language: English, Database: CAPLUS

The magnetic relaxation was studied in type II superconductors when the initial magnetic state is realized with entrapped and shielded flux (ESF) contemporarily. This flux state is produced by an inversion in the magnetic field ramp rate due to for example a magnetic field overshoot. The study was faced both numerically and by measuring the magnetic relaxation in **BSCCO** tapes. Numerical computations were performed in the case of an infinite thick strip and of an infinite slab, showing a quickly relaxing magnetization in the 1st seconds. As verified exptl., the effects of the overshoot cannot be neglected simply by cutting the 1st 10-100 s in the magnetic relaxation. However, at very long times, the magnetic states relax toward those corresponding to field profiles with only shielded flux or only entrapped flux, depending on the amplitude of the field change with respect to the full penetration field of the considered superconducting samples. The authors have performed numerical simulations to reproduce the relaxation curves measured on the **BSCCO(2223)** tapes; this allowed the authors to interpret correctly also the 1st seconds of the $M(t)$ curves.

~0 Citings

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87. AC losses in a toroidal superconducting transformer

By Perez, B.; Alvarez, A.; Suarez, P.; Caceres, D.; Ceballos, J. M.; Obradors, X.; Granados, X.; Bosch, R.

From [IEEE Transactions on Applied Superconductivity](#) (2003), 13(2, Pt. 2), 2341-2343. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2003.813122

In order to study the viability of coreless AC coupled coils, a superconductor transformer based on **BSCCO-2223** PIT tapes was constructed. To achieve the min. flux leakage, a toroidal geometry was selected. Both secondary and primary coils were wound around a glass fiber reinforced epoxy torus, obtaining a solid system. The field inside the transformer, the coupling factor, and the losses in the system were computed and measured, providing suitable parameters for new improvements in these systems.

~2 Citings

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88. Design of a 1 MVA high T_c superconducting transformer

By Kim, Woo-Seok; Hahn, Song-Yop; Choi, Kyeong-Dal; Joo, Hyeong-Gil; Hong, Kye-Won

From [IEEE Transactions on Applied Superconductivity](#) (2003), 13(2, Pt. 2), 2291-2293. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2003.813080

A 1 MVA transformer using **BSCCO-2223** high T_c superconducting (HTS) tapes was designed. The rated voltages of each sides of the transformer for primary and secondary are 22.9 kV and 6.6 kV resp. Double pancake HTS windings, which have advantages of insulations and distribution of high voltage, were adopted. Four HTS tapes were wound in parallel for the windings of low voltage side. Each winding was composed of several double pancake windings and four parallel conductors of secondary winding were transposed in order to distribute the currents equally in each conductor. The core of the transformer was designed as a shell type core made of laminated silicon steel plate and the core is sepd. from the windings by a cryostat with a room temp. bore. Configuration of the cryostat made of nonmagnetic and nonconducting material and a liq. nitrogen sub-cooling system were used in order to maintain the coolant's temp. of 65 K.

~7 Citings

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89. Test of an induction motor with HTS wire at end ring and bars

By Sim, Jungwook; Park, Myungjin; Lim, Hyoungwoo; Cha, Gueesoo; Ji, Junkeun; Lee, Jikwang
From [IEEE Transactions on Applied Superconductivity](#) (2003), 13(2, Pt. 2), 2231-2234. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2003.813053

Motors with HTS wires or bulks have been developing recently. Those are large synchronous motor with HTS wires at the field winding in the rotor, hysteresis and reluctance motors with HTS bulk in the rotor. This paper presents the fabrication and test results of an HTS induction motor. Conventional end rings and short bars were replaced with HTS wires in the motor. Stator of the conventional induction motor was used as the stator of the HTS motor. Rated capacity and rpm at full rotor of the conventional motor were 0.75 kW and 1710 rpm. Two HTS wires are used in parallel to make the end rings and bars. The crit. current of the **BSCCO-2223** HTS wire which was used in the bars and end rings were 115 A. Electrodynamometer was coupled directly to the shaft of the rotor with HTS wires.

~5 Citings

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90. Design, analysis, and fabrication of a tri-axial cable system

By Fisher, P. W.; Cole, M. J.; Demko, J. A.; Foster, C. A.; Gouge, M. J.; Grabovickic, R. W.; Lue, J. W.; Stovall, J. P.; Lindsay, D. T.; Roden, M. L.; et al
From [IEEE Transactions on Applied Superconductivity](#) (2003), 13(2, Pt. 2), 1938-1941. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2003.812969

Encouraged by the pos. test results of a ~ 1.5-m long prototype tri-axial cable, the Southwire Company/Oak Ridge National Lab. (ORNL) team has conceived, designed, and built a 5-m tri-axial cable with three-phase terminations. The three concentric superconducting phases are made of **BSCCO-2223** high-temp. superconducting (HTS) tapes, sep'd. by layers of cold-dielec. (CD) tape. A copper braid is added as the grounding shield. The completed tri-axial cable is enclosed in a flexible cryostat. Cooling of the cable and terminations is achieved by liq. nitrogen flowing through the annulus between the cable and the cryostat. A challenging anal. and design problem was development and implementation of an insulator material between the concentric phases with high enough thermal cond. to meet temp. gradient requirements and acceptable mech. performance (strength and contraction on cool down). The resulting three-phase, CD cable and termination design is nearly as compact as the single-phase, co-axial design developed previously by Southwire/ORNL and represents the highest cable c.d. achievable in an elec. alternating-current power cable.

~12 Citings

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91. Pseudoperiodic nanostructuring of Ag-clad **BSCCO-2223 multifilamentary tapes as a tool to tune in-field superconducting performance**

By Gerbaldo, R.; Botta, D.; Chiodoni, A.; Ghigo, G.; Gozzelino, L.; Laviano, F.; Minetti, B.; Mezzetti, E.; Rovelli, A.; Amato, A.; et al
From [IEEE Transactions on Applied Superconductivity](#) (2003), 13(2, Pt. 3), 3000-3003. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2003.812051

A technol. has been developed to create nanostructures by heavy-ion irradiation on "large area" surfaces of superconductors. The in-vacuum app. consists of a moving sample-holder, automatically driven at a given velocity in order to obtain the exposure of collimated zones of the moving target to a programmed ion fluence. The irradiation facility has been employed to implant 4.2 GeV gold-ions into a 30 cm long multifilamentary Ag/**BSCCO-2223** tape, at the dose equiv. field of 0.5 T. The paper is focused on the enhanced performance and on the matching effects between the pseudo-periodic array of ion-induced columnar defects and the vortex lattice. The enhancements exhibit a max. near the dose equiv. field, clearly pointing out the tunability of the performance through the modulation of the distance between nanotracks.

~3 Citings

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92. Superconducting joint of multifilamentary Bi(Pb)-Sr-Ca-Cu-O tapes

By Kim, Kyu Tae; Kim, Jung Ho; Joo, Jinho; Nash, Philip

From [IEEE Transactions on Applied Superconductivity](#) (2003), 13(2, Pt. 3), 2996-2999. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2003.812050

We joined **BSCCO(2223)** multifilamentary tapes and evaluated their elec. and mech. properties. In the process, two superconducting-joint methods were used; one is direct connection of two multifilamentary tapes (MM-joint), and the other is connection of them by using one or two single filamentary tape MSM- and double-MSM-joint. The crit. current ratio (CCR) and n-value of the jointed tapes were evaluated as a function of uniaxial pressure. It was obsd. that the CCR and n-value were 24.8-29.0% and 2.5-2.8, resp., for MM jointed tape. On the other hand, the corresponding values were improved to 24.8-53.9% and 2.9-4.1 for MSM- and 63.4-76.0% and 3.5-5.1 for double-MSM-jointed tape, resp. The highest elec. properties of double-MSM-joint are considered to be due to the presence of single core, resulting in better interconnections of multifilaments between the two tapes. The mech. property of jointed tape was also evaluated and correlated to the microstructural evolution.

~0 Citings

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93. Measurements of the performance of **BSCCO** HTS tape under magnetic fields with a cryocooled test rig

By Young, M. A.; Demko, J. A.; Gouge, M. J.; Pace, M. O.; Lue, J. W.; Grabovickic, R.

From [IEEE Transactions on Applied Superconductivity](#) (2003), 13(2, Pt. 3), 2964-2967. Language: English, Database: CAPLUS, DOI:10.1109/TASC.2003.812076

The use of high-temp. superconducting (HTS) materials for elec. power applications is being realized in prototype systems. A test rig was designed and fabricated that uses a 6-T cryocooled magnet with an 20.3 cm warm bore. Inserted in the bore is a stainless steel vacuum vessel that has a Cryomech GB37 cryocooler to conductively cool the sample. Crit. current measurements were made on **BSCCO-2223** tapes under externally applied perpendicular and parallel magnetic fields. A description of the test rig design and results from measurements will be presented.

~17 Citings

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94. The stability range of lead oxide compounds in **BSCCO-2223** precursor powders

By Li, M. Y.; Chen, X. P.; Qu, T. M.; Liu, Q.; Han, Z.

From [Physica C: Superconductivity and Its Applications](#) (Amsterdam, Netherlands) (2004), 407(3-4), 115-120. Language: English, Database: CAPLUS, DOI:10.1016/j.physc.2004.05.010

The stability range of lead oxide compds. $\text{Pb}_3\text{Sr}_{2.5}\text{Bi}_{0.5}\text{Ca}_2\text{CuO}_y$ (3321) phase and Ca_2PbO_4 phase in **BSCCO** materials has been investigated. In this study $(\text{Bi,Pb})_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_x$ (**BSCCO**) materials were heat treated in different oxygen partial pressure ranges from 1.0% O_2 to 20.8% O_2 . The formation and decompn. of lead oxide compds. were detd. by oxygen absorption and release processes, which were monitored with an oxygen analyzer. The phase compn. was detd. by X-ray diffraction. Exptl. results show that the stability range of lead oxide compds. depends on the temp. and the oxygen partial pressure during heat treatment. Increasing oxygen partial pressure broadens the temp. range of the stable range of the (3321) phase, whereas the formation temp. of the (3321) phase remains at about 590°C. Ca_2PbO_4 phase is more stable at higher temp. compared with the (3321) phase.

~1 Citing

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95. Fabrication of **BSCCO** thin films using sputtering technique

By Salamati, Hadi; Kameli, Parviz; Akhavan, Mohammad

From [Physica Status Solidi C: Conferences and Critical Reviews](#) (2004), 1(7), 1895-1898. Language: English, Database: CAPLUS, DOI:10.1002/pssc.200304492

Study of **BSCCO 2223** phase formation in superconducting thin films of Bi-based cuprates deposited on MgO substrate is reported. Films were made by in situ dc-magnetron sputtering method and another series were made by ex situ radiofrequency-magnetron sputtering technique. Same target were used in both technique. In the case of the ex situ method, the films were annealed for different period of time at 800°, and in the case of in situ method, the films were deposited at different temp. substrate. The influence of annealing time and the temp. of the substrate on the quality and the phase formation for ex situ and in situ method have studied, resp. The results of the authors' studies show, although the samples prepd. by in situ method have a better mech. and supercond. properties, the post-annealed ex situ prepd. samples have a superb structural and supercond. properties.

~0 Citings

96. Optimization studies on thermal and mechanical manufacturing processes for multifilament superconducting tape and wire

By Basaran, Burak; Yavuz, Mustafa

From [Materials Research Society Symposium Proceedings \(2004\)](#), EXS-3(Frontiers in Superconducting Materials--New Materials and Applications), 125-127. Language: English, Database: CAPLUS

There are many parameters effective on the elec. performance of ceramic core superconducting composites, which require more labor on their optimization. **BSCCO 2212** was not paid the attention it deserved in this regard; optimization efforts were made for **BSCCO 2223**. In the authors' work, a practical/inexpensive manufg. method, thermally and mech. optimized for Pb doped BiSrCaCuO 2212 superconducting 38 filament wires and tapes, was successfully employed. Parameters involved with materials included study of deformation behavior of two different sheath metals; pure Ag and 0.02% Mg pptn. hardened Ag alloy. Pb doped **BSCCO 2212** ceramic powder was synthesized following thermal co-decompn. method. To reduce sausaging, optimization of drawing deformation was practiced. Rolling of the wire products into tapes included variable and const. redn.-per-pass deformation paths to reveal their effects on composites with distinct sheath material and filament formation. Modified version of step solidification partial melting was employed successfully. A soln. through tried recipes for the bubbling problem that occurred with the authors' tapes was also addressed. Elec. performance tests of wires were carried out in the authors' lab. and promising results were attained.

~0 Citings

97. Verification of a thermal interpretation of **BSCCO-2223/Ag current-voltage hysteresis**

By Sastry, P. V. P. S. S.; Nguyen, D. N.; Usak, P.; Schwartz, J.

From [Superconductor Science and Technology \(2004\)](#), 17(3), 314-319. Language: English, Database: CAPLUS, DOI:10.1088/0953-2048/17/3/003

The current-voltage characteristic hysteresis of Bi-**2223** tape in a silver matrix cooled by liq. nitrogen (LN₂) at 77 K can be interpreted thermally, i.e. while the ramping-up temp. of the tape is higher than the ramping-down temp. for the same current levels. The reason for this could be hysteresis of the heat transfer coeff. The coeff. is smaller during ramping up and larger (better cooling) during ramping down. To verify or deny this concept we have measured the surface temp. of the tape at LN₂ temp. with and without a thermal insulation sheet upon the tape during ramping up over I_c and ramping down back under I_c . Different ramping rates were applied. The amplitudes of E on the tape was under 0.5 mV cm⁻¹. In spite of measurement error and thermal fluctuations, we obsd. a difference between the surface temp. curve branch during ramping up and the higher branch during ramping down for a non-insulated tape. Furthermore, the measurements showed that a pos. current-voltage (I-V) hysteresis pattern (with the down branch shifted to higher currents and smaller voltages) was obsd. even with thermal insulation. Under these conditions, however, the down branch of the temp. curve clearly revealed a higher temp. with respect to the up branch of the temp., contrary to expectations of the thermal interpretation of I-V hysteresis. According to this result, the thermal concept of pos. I-V hysteresis under stable cooling conditions can be denied. An accidental voltage drop in the I-V curve was obsd. on one degraded sample accompanied by a corresponding drop in temp. This proves the thermal interpretation of voltage drops in I-V curves of locally degraded tapes.

~4 Citings

98. Effect of starting precursor powders on microstructural development and critical current density properties of **BSCCO 2223 tapes**

By Ko, J. W.; Yoo, J. M.; Kim, Y. K.; Oh, K. H.; Choe, S. J.; Chung, H.

From [Cryogenics \(2003\)](#), 43(10-11), 549-553. Language: English, Database: CAPLUS, DOI:10.1016/S0011-2275(03)00161-9

Bi-**2223/Ag** tapes with different lead content (Pb = 0.2-0.4) powders were fabricated. The microstructural development and J_c properties were studied with starting precursor powder prepd. in different conditions. The exptl. results indicate that the variations of lead content extremely influence the reactivity of precursor powders, which is closely related to the formation rate of **2223** phase, microstructure and J_c values of Bi-**2223/Ag** tapes. In addn., the particle size distribution of precursor powders has a large effect on the transport properties. By optimizing these powder parameters, J_c values above 60,000 A/cm² (77 K, 0 T) in short tapes were achieved.

~4 Citings

99. Influence of Ca content on the microstructure and transport property of Ag-sheathed Bi-2223 tapes

By Jiang, Chunhai; Qiao, Guiwen

From [Jinshu Xuebao](#) (2003), 39(8), 799-802. Language: Chinese, Database: CAPLUS

Four kinds of **BSCCO 2223** precursor powders with different Ca contents were prep'd. by the spray drying method. The influence of Ca doping on the phase evolution, microstructure and transport property of Bi-2223/Ag tapes was studied. It is found that increasing the Ca content in initial stoichiometry can accelerate the 2223 phase formation and improve the transport I_c , however, much more Ca-rich non-superconducting secondary phases were also induced at the same time. It is supposed that Ca doping has increased the amt. of liq. phase during the heat treatment, which in turn improved the phase formation, grain growth and grain connectivity, hence resulting in the enhanced current transport ability.

~0 Citings

100. High-temperature superconducting tri-axial power cable

By Gouge, M. J.; Cole, M. J.; Demko, J. A.; Fisher, P. W.; Foster, C. A.; Grabovickic, R.; Lindsay, D. T.; Lue, J. W.; Roden, M. L.; Tolbert, J. C.

From [Physica C: Superconductivity and Its Applications](#) (Amsterdam, Netherlands) (2003), 392-396(Pt. 2), 1180-1185. Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(03)00788-3

Encouraged by the pos. test results of a 1.5-m long prototype tri-axial cable, the Southwire/ORNL team has conceived, designed and built a 5-m tri-axial cable with three-phase terminations. The three concentric superconducting phases are made of **BSCCO-2223** HTS tapes, sep'd. by layers of cold-dielec. tape. A Cu braid is added as the grounding shield. The completed tri-axial cable is enclosed in a flexible cryostat. Cooling of the cable and terminations is achieved by liq. N flowing through the annulus between the cable and the cryostat. The terminations used in the cable tests are cooled by a sep. liq. N stream. The resulting three-phase, cold dielec., cable and termination design is nearly as compact as the single-phase, co-axial design developed previously by Southwire/ORNL and represents the highest known cable c.d. achievable in an elec. a.c. power cable. DC testing of the 5-m cable includes V-I curves for each of the concentric HTS phases, cable heat loads at varying d.c. currents, liq. N flow-pressure measurements, and over-current tests. AC testing of the cable includes a.c. loss measurements, induced-current in the Cu-shield measurements and operation at the line voltage test. The a.c. losses are measured calorimetrically by measuring the temp. differential of the coolant across the cable length due to the a.c. loss in the superconductors. Both balanced and un-balanced currents among the three phases were used in a.c. loss and induced current measurements.

~3 Citings

101. Fundamental and high-order harmonic susceptibilities of a BSCCO(2223) bulk superconductor

By Aksu, E.; Gencer, A.; Yilmaz, H.; Nezir, S.

From [Physica C: Superconductivity and Its Applications](#) (Amsterdam, Netherlands) (2003), 391(1), 67-74. Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(03)00864-5

Measurements of fundamental and high-order harmonic susceptibilities, $\chi_n = \chi_n' + i\chi_n''$ ($n = 1, 2, 3, 5$ and 7), were made on a cylindrical $\text{Bi}_{1.6}\text{Pb}_{0.4}\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{10}$ bulk sample in the range 15-120 K at fields ranging from 8 to 1600 A/m and 1000 Hz frequency. They exhibit dependence on the amplitude of the a.c. field. The obsd. dependences were analyzed by using the Bean model. The authors have obtained an empirical function for the penetration field $H_p = H_\alpha(1-t)^\beta$, with $t = T/T_{cb}$. Best fitting to data was obtained with parameters $H_\alpha \approx 3.3 \times 10^4$ A/m and $\beta = 2.05$. Ac losses were calcd. at some fixed temps. to compare theor. expectations. The exptl. values agree well with the theor. findings. AC losses were calcd. under external fields ranging from 0 to 1600 A/m and, at 84.35 K, the exptl. results agree well with the theor. values.

~2 Citings

102. BSCCO (2223) and MgB2 wires and tapes. A comparison

By Goldacker, Wilfried

From [Advances in Science and Technology](#) (Faenza, Italy) (2003), 38(Science and Engineering of HTC Superconductivity IV), 159-170. Language: English, Database: CAPLUS

A review. High temp. superconductors (HTS) are very promising for the application in devices of energy technique, a breakthrough is so far hindered through the high cost level and the sophisticated prodn. technique. **BSCCO** HTS superconductors, esp. **BSCCO(2223)** with a crit. temp. of 110 K, are meanwhile ≈ 14 yr under development and a com. product. The recent discovery of supercond. in MgB_2 below 40 K raised the hope for a new high current carrying cheap HTS conductor for the application at 20 K using cryocooler systems. Already existing high current MgB_2 wires and tapes allow a first comparison with **BSCCO** and an evaluation of the further prospects for the application in the 4.2-25 K temp. range.

~0 Citings

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103. An Irradiation Facility for In-Vacuum Heavy-Ion Irradiation of Large Area Superconductors

By Rovelli, A.; Amato, A.; Botta, D.; Chiodoni, A.; Gerbaldo, R.; Ghigo, G.; Gozzelino, L.; Laviano, F.; Negro, M.; Mezzetti, E.; et al

From [International Journal of Modern Physics B: Condensed Matter Physics, Statistical Physics, Applied Physics](#) (2003), 17(4, 5 & 6, Pt. 2), 727-733. Language: English, Database: CAPLUS

An irradiation facility to irradiate long stripe-shaped high- T_c superconductors by GeV heavy ions is described. This facility was designed and installed at INFN - Laboratori Nazionali del Sud (LNS), Catania, Italy. It consists into a moving app. automatically driven at a given velocity to obtain the in-vacuum exposure of contiguous zones of the moving target at a programmed ion fluence. The whole app. is automatically controlled by a home-made remote control program. The main parts of the app. are the mech. set-up and the electronic circuit to create feedback signals to control both the beam current and the velocity of the sample holder, the high accuracy system for the measure of the integrated charge and the beam calibration set-up (beam shape and homogeneity). This app. is, at the authors' best knowledge, the 1st one esp. designed to create nanostructures across large area superconducting devices by the irradiation. Some significant results of 4.2 GeV Au-ion irradiation of a long high- T_c superconducting multifilamentary Ag/**BSCCO-2223** tape are shown.

~0 Citings

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104. Electrical, Thermal and Mechanical Stability of AFM **BSCCO-2223** Composite Conductors for Current Lead Applications

By Martini, L.

From [International Journal of Modern Physics B: Condensed Matter Physics, Statistical Physics, Applied Physics](#) (2003), 17(4, 5 & 6, Pt. 1), 477-483. Language: English, Database: CAPLUS

The relevant properties of AFM **BSCCO-2223**/Ag-Au composite conductors and the most crucial tech. problems faced in the design and manufg. of current leads (CLs) are presented and discussed. Important issues such as thermal stability of AFM conductors, their effective mech. reinforcement and the viable tech. solns. for kA-class CLs are addressed. AFM **BSCCO-2223** composite conductors and kA-class AFM bundles went through an extensive elec., thermal and mech. characterization to evaluate and possibly improve their overall performances and to increase their potential and range of application. Exptl. results on ageing tests on AFM specimens, with and without mech. reinforcement, after thermal cycling in liq. N and quench expts., induced by overcurrents and/or lacking of cooling, are reported and discussed.

~0 Citings

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105. Random instabilities of current-voltage curves of **BSCCO-2223**/Ag multifilamentary tapes in LN2 at 77 K

By Usak, P.

From [Superconductor Science and Technology](#) (2003), 16(4), 459-463. Language: English, Database: CAPLUS

The measurement of the current-voltage (I-V) characteristics of **BSCCO-2223**/Ag multifilamentary tapes in a Ag matrix was performed on short samples (of several centimeters) as well as on long tape (1 m), wound as a helical 1-layer coil. Measurements at 77 K and in zero external magnetic field revealed good reproducibility of the I-V hysteresis in most runs. Nevertheless, strange irregularities have sometimes been obsd. in the I-V curve behavior during current ramping up and down. Quasi-reproducible drops from the ascending hysteretic branch in the direction of the descending one were measured at higher voltage levels ($\sim 1 \text{ mV cm}^{-1}$) on the curve measured on the helical coil. These have recently been explained by a sudden change in the heat transfer coeff. [1]. Rarely and non-reproducibly the authors also obsd. these drops on short samples at $E \sim 1 \times 10^{-2} \text{ V m}^{-1}$, (and even under $1 \times 10^{-3} \text{ V m}^{-1}$). The accidental drops also were sporadically measured by other experimenters. The authors also interpret these effects as a result of changes in heat transfer dynamics to LN2 coolant, on a local scale, in the vicinity of a small locally degraded portion of the superconducting multifilament tape. The implication of the known differences in the heat transfer dynamics between ramp-up and ramp-down phases to the thermal interpretation of the I-V curve hysteresis, obsd. on short samples of multifilament tapes, however, fails to explain why already a rather small external magnetic field ($\sim 15 \text{ mT}$) suppresses this hysteretic effect.

~2 Citings

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106. Strength and fracture toughness of hot-pressed bulk **Bi₂Sr₂Ca₂Cu₃O_x** and **Bi₂Sr₂Ca₂Cu₃O_x/Ag** at 77 and 300 K

By Salazar, A.; Pastor, J. Y.; Llorca, J.

From [Physica C: Superconductivity and Its Applications \(Amsterdam, Netherlands\) \(2003\), 385\(3\), 404-414](#). Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(02)02256-6

A study was made of the effect of temp. (300 and 77 K) and orientation on the mech. properties of bulk **BSCCO 2223** and **BSCCO 2223**/Ag composites processed by hot-pressing. The unreinforced material was strongly textured and almost fully dense and its flexure strength was outstanding. The flexure strength of the composites showed the balance between the benefits due to the presence of Ag, and the harmful impact of higher porosity and reduced texture. The strength of all the materials was fairly independent of the orientation and temp., although a noticeable improvement (6-20%) was found at 77 K when the crack propagation direction was parallel to the hot-press axis. The fracture toughness was mainly a function of the porosity with the dense, **BSCCO 2223** material showing the highest value. In addn., the toughness was largely influenced by orientation and temp., again reaching max. (by up to 70%) in the specimens tested at 77 K with the crack plane parallel to the hot-press axis. This behavior was explained in terms of the crack deflection and of the toughening effect of ice.

~8 Citings

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107. Optimization of precursor powders for manufacturing **Bi-2223**/Ag tapes

By Jiang, C. H.; Yoo, J. M.; Ko, J. W.; Chung, H. S.; Qiao, G. W.

From [Superconductor Science and Technology \(2003\), 16\(1\), 85-89](#). Language: English, Database: CAPLUS, DOI:10.1088/0953-2048/16/1/315

The phase assemblage and particle sizes of precursor powders have been optimized in a sequence for fabricating Ag/**BSCCO-2223** composite tapes. Firstly, an optimal calcination temp. was detd. based on the exptl. results. Then, the precursors calcined at the optimal temp. were ball-milled for different dwell times to obtain varied particle sizes. The effects of both the phase assemblages and particle sizes of the precursor powder on the phase formation, microstructure and transport J_c of **Bi-2223**/Ag tapes have been investigated. The results show that the precursor phase assemblage has a large impact on the reaction routes, microstructure, and J_c property. Meanwhile, a fine powder is beneficial for the grain growth, alignment, and J_c enhancement in fully reacted tapes. The best J_c was achieved in the tape made from the powder after optimizing the phase assemblage and particle size.

~1 Citing

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108. Study on the Physical and Electrical Properties of **Bi_{2-δ}Zn_δSr₂Ca₂Cu₃O_{10+y}** Glass-Ceramic Superconductors

By Aksan, M. A.; Yakinci, M. E.; Balci, Y.

From [Journal of Superconductivity \(2002\), 15\(6\), 553-558](#). Language: English, Database: CAPLUS

We have fabricated a series of glass-ceramic ($\text{Bi}_{2-\delta}\text{Zn}_\delta$) $\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{10+y}$, where $\delta = 0.0, 0.2, 0.4, 0.6, 0.8$, and 1.0 , and investigated the effect of Zn ions on the glass formation, crystn., thermal, elec., and on the magnetic properties of the **BSCCO-2223** superconductor system. The structural symmetry was found to be tetragonal in all the substitution levels. The best elec. performance was obtained from the $\delta = 0$ sample, the T_c and T_{zero} was obtained at 110 K and 107 K, resp. The J_c values of the samples were detd. using the magnetization hysteresis and Bean's model. The crystn. kinetics were investigated using nonisothermal models of Augis-Bennett. The calcd. activation energy, E_a , of the system was found to be in the range of 258-336 kJ/mol.

~12 Citings

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109. Superconducting properties of **BSCCO (2223)** ultrathin films

By Navarrete, L.; Marino, A.; Sanchez, H.

From [Surface Review and Letters](#) (2002), 9(5 & 6), 1757-1760. Language: English, Database: CAPLUS

Ultrathin films of (Bi-Pb)-Sr-Ca-Cu-O (**2223**) were produced by ex situ RF magnetron sputtering on MgO (100) substrates. Films with different thermal treatments and thickness varying between 30 nm and 300 nm were obtained and studied systematically. A structural characterization of these samples was carried out and correlated with their elec. properties and thickness.

~1 Citing

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110. Improvement of the weak-link in **BSCCO** by controlled overlapping of excimer laser exposure

By Ibi, A.; Akitsu, T.; Saito, Y.; Matsuzawa, H.

From [Physica C: Superconductivity and Its Applications \(Amsterdam, Netherlands\)](#) (2002), 378-381(Pt. 1), 688-691.

Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(02)01522-8

Excimer laser annealing is a novel scheme to reduce the surface weak-link of the high- T_c superconductors. The authors studied the optimal energy d. of excimer laser and the effect of the overlapped area of the laser spots on the **BSCCO(2223)** samples using Kr-F excimer laser. The superconductor pellets were exposed to the laser with step-and-repeat process, and were then sintered. To form tightly linked intergrain boundaries, such optimal condition was exptl. detd. as to have neither overlapping nor sepn. of the adjacent laser spots on the pellets, for an optimized laser energy d. of 0.3-0.4 J/cm². When the exposure condition was deviated from the optimal one, the superconductors showed much decrease in crit. temp. T_c .

~0 Citings

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111. Simulation of texture evolution during wire drawing of **BSCCO** superconductors

By Ahzi, S.; Haque, I.; Tombat, S.

From [Materials Science Forum](#) (2002), 408-412(Pt. 2, Textures of Materials), 1717-1722. Language: English,

Database: CAPLUS, DOI:10.4028/www.scientific.net/MSF.408-412.1717

Conducting properties are highly anisotropic in high-temp. superconducting oxides such as Bi-Sr-Ca-Cu oxides. They largely depend on the degree of alignment of the superconducting crystallog. planes with the direction of the current. We are particularly interested in the modeling and simulation of the wire drawing of **BSCCO 2223** superconductors. We have simulated the deformation behavior and texture evolution during the drawing process of this superconducting compd. We analyzed texture gradient in the wire and the effects of the drawing parameters on these textures. These simulations are made possible by combining finite element anal. with micromech. modeling of plasticity in **BSCCO** polycrystals. Texture results are discussed with regard to the efficiency of the wire as a superconductor.

~0 Citings

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112. Critical fluctuations in the microwave complex conductivity of **BSCCO** and YBCO thin films

By Peligrad, D.-N.; Nebendahl, B.; Mehring, M.; Dulcic, A.

From [Los Alamos National Laboratory, Preprint Archive, Condensed Matter](#) (2002), 1-4, arXiv:cond-mat/0209176.

Language: English, Database: CAPLUS

Crit. fluctuations above T_c are studied in the microwave complex cond. of **BSCCO-2212**, **BSCCO-2223**, and YBCO thin films. The anal. of the exptl. data yields the temp. dependences of the reduced coherence length $\xi(T)/\xi_0$. Two crit. regimes are obsd., having the static crit. exponent $\nu = 1$ close to T_c , and a crossover to $\nu = 2/3$ at higher temps. In more anisotropic superconductors the reduced coherence lengths are larger, and the crit. states extend to higher temps.

~2 Citings

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113. Hysteresis losses in **BSCCO(2223)/Ag** multifilamentary tapes

By Zola, D.; Polichetti, M.; Senatore, C.; Di Matteo, T.; Pace, S.

From *Physica C: Superconductivity and Its Applications* (Amsterdam, Netherlands) (2002), 372-376(Pt. 3), 1823-1826.

Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(02)01135-8

In order to investigate hysteresis losses on Ag-sheathed **BSCCO(2223)** multifilamentary tapes, the authors perform hysteresis loop measurements, with the external magnetic field H_e perpendicular to the tape surface, for different sweep rates of the magnetic field and at different temps. T . The exptl. results show a sweep rate dependence equiv. to the frequency dependence of the hysteretic losses. In order to consider the role of the thermally activated flux creep in the losses, the authors numerically solve the diffusion equation for the magnetic field B inside a superconducting slab. For magnetic fields lower than 2.5 T and in the temp. and frequency range investigated, the numerical and exptl. results show that the losses have a logarithmic dependence on the sweep rate. For higher field and increasing temp., the logarithmic behavior is no longer obsd. at higher frequencies.

~2 Citings

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114. Beneficial effect of solid nitrogen on a **BSCCO-2223/Ag** composite tape subjected to local heating

By Sugawara, Akira; Isogami, Hisashi; Haid, Benjamin J.; Iwasa, Yukikazu

From *Physica C: Superconductivity and Its Applications* (Amsterdam, Netherlands) (2002), 372-376(Pt. 3), 1443-1446.

Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(02)01120-6

This paper presents results of a quench/recovery expt. for a **BSCCO-2223/Ag** composite tape in the presence or absence of a thin layer of solid nitrogen on each side of the tape. Voltage and temp. data were recorded for a 20-cm long **BSCCO-2223/Ag** tape operating in the range 20-55 K and subjected to a heat pulse of a 10-600 s duration applied over a short distance at its midpoint. The data clearly show that solid nitrogen is beneficial to the stability of high-temp. superconductors operating in this temp. range and subjected to transient heating disturbances.

~4 Citings

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115. Reliable commercial HTS wire for power applications

By Kellers, Jurgen; Masur, Lawrence J.

From *Physica C: Superconductivity and Its Applications* (Amsterdam, Netherlands) (2002), 372-376(Pt. 2), 1040-1045.

Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(02)00966-8

A review. The prodn. of HTS wire for power applications is increasingly maturing into industrial dimensions. The most widely considered manufg. method for this conductor is the **BSCCO-2223-OPIT** route, used internationally by many organizations, including American Superconductor. Significant advances in HTS wire technol. were made in the past years, with currently a guaranteed min. crit. current performance of 115 A at 77 K over com. long length. For the HTS wire itself this is equiv. to an engineering c.d. of 13.5 kA/cm². During the past 18 mo, American Superconductor increased its HTS wire manufg. capacity in its Westborough operations from 250 to 500 km/yr to meet the increased demand for development and demonstration purposes. While this level of quality and quantity is sufficient to demonstrate tech. feasibility and reliability of prototype power applications, it cannot satisfy fully com. requirements for economic viability. To address broader markets with a com. viable product, a price level of $\leq 0/(kA m)$ is possible with **BSCCO-2223-OPIT** when manufd. in much larger quantities. Therefore, American Superconductor is currently siting a new facility dedicated solely to the manufg. of **BSCCO-OPIT-2223** wire in quantities of 10,000 km/yr. Key initial applications for this wire are power transmission cables, industrial motors and elec. generators. This paper will report on the performance and reliability testing of **BSCCO-2223** wires. The authors will discuss the elec., bending, tensile, and fatigue testing results of wires manufd. for applications such as American Superconductor's 5000 hp ultra-compact motor. Due to their compactness, these motors will be less expensive to manuf. compared with conventional motors and will be more energy efficient. The authors will also review the stringent elec., mech., and environmental testing developed jointly by American Superconductor and Pirelli Cables and Systems for simulating the behavior of HTS wires under the actual operating conditions for an underground power cable. Also, the authors will give an update of the status of the authors' new manufg. plant which is planned to be operational in 2002.

~10 Citings

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116. Microstructural and texture analysis of BSCCO-2223 superconducting tape

By Ji, Bong Ki; Lim, Jun Hyung; Joo, Jinho; Nah, Wansoo; Park, No-Jin

From [Physica C: Superconductivity and Its Applications \(Amsterdam, Netherlands\) \(2002\), 372-376\(Pt. 2\), 992-994.](#)

Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(02)00953-X

The authors evaluated the microstructural evolution and the degree of texture of single filamentary BSCCO-2223 superconductor tape. Specifically, to characterize the positional degree of texture inside the BSCCO core quant., a pole figure anal. was taken on the surfaces at different depths of superconducting core, and correlated to the microstructural study. Pole figure anal. indicated that the degree of texture varied with depth of the superconductor core, and was higher near the interface than inside the core. Electron-probe microanal. anal. showed that the 2nd phases were randomly distributed and there is no remarkable difference in the distribution of 2nd phases inside the BSCCO core.

~3 Citings

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117. Strategic flat rolling of Ag/BSCCO-2223 tapes

By Nielsen, M. S.; Bech, J. I.; Eriksen, M.; Bay, N.

From [Physica C: Superconductivity and Its Applications \(Amsterdam, Netherlands\) \(2002\), 372-376\(Pt. 2\), 966-969.](#)

Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(02)00946-2

In the process of single-step flat rolling of multifilament Ag/BSCCO-2223 wire to tape previous work has shown the optimum strategy giving max. crit. c.d. to be a balance between the length and width strain, so they are of equal size i.e. so, that the logarithmic strain ratio, LSR, reaches zero. In order to investigate the possible improvements by using multistep flat rolling, a new strategy to control the LSR in each individual step, i.e. to control the differential logarithmic strain ratio DLSR, has been investigated. The present paper shows that appropriate choice of the processing conditions may be used to reach DLSR=0 in each step, and suggests dimensionless parameters applicable to transfer the results to other wire dimensions. The tapes produced engineering current densities of up to 7.6 kA/cm² with an av. of 7.2 kA/cm².

~1 Citing

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118. Manufacture of ceramic superconductors by cryogenic deformation

By Dou, S. X.; Hu, Q. Y.; Guo, Y. C.; Liu, H. K.

From [Pat. Specif. \(Aust.\) \(2002\), AU 742588 B2 20020110,](#) Language: English, Database: CAPLUS

The process comprises the steps of: (a) forming a ceramic superconductor precursor material having a metal sheet; (b) cryogenically deforming the precursor material between -150°C and -210°C; and (c) sintering the cryogenically deformed material. The process is suitable for manuf. of any high-temp. superconductors of YBCO, BSCCO, TBCCO, HBCCO types. Ag and Ag alloys are used as metal sheets. The sheathed single- or multifilamentary wires, tapes, coils, leads, and cables produced by this method have improved flux pinning. In one embodiment, the cryogenically pressed Ag-clad BSCCO 2223 tape has a J_c 20% higher than that of the tape pressed under normal processing conditions.

~0 Citings

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119. Bending strain investigations on BSCCO(2223) tapes at 77K applying a new bending technique

By Goldacker, W.; Schlachter, S. I.; Nast, R.; Reiner, H.; Zimmer, S.; Kiesel, H.; Nyilas, A.

From [AIP Conference Proceedings \(2002\), 614\(Advances in Cryogenic Engineering\), 469-476.](#) Language: English, Database: CAPLUS

A new bending device was developed which allows continuous change of the bending radius of the **BSCCO** tape sample at 77 K and a simultaneous measurement of the crit. currents. The samples are mounted free between two clamps. The special geometry of the arrangement insures over the whole range a sample shape with homogeneous curvature on a circle line without the help of mech. parts. This bending strain rig avoids effects from addnl. thermal stresses due to the cooling from room temp. (bending) to 77 K (crit. current measurement). The authors mainly present measurements on different Ag/AgMg sheathed std. conductors. The results obtained with the new method will be compared for some selected samples with the bending strain behavior measured in the conventional way, applying the bent at RT. The potential of the method being suitable for standardized bending expts. is discussed.

~3 Citings

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120. Progress report on the preparation of Co substitution for Cu in **BSCCO(2223)** superconductor

By Sangariyanich, Archara; Ampornrat, Pantip

From [JAERI-Conf \(2001\), 2001-017\(Proceedings of the 2000 Workshop on the Utilization of Research Reactors\)](#), 76-80. Language: English, Database: CAPLUS

The samples of $\text{Bi}_2\text{Sr}_2\text{Ca}_2(\text{Cu}_{(1-x)}\text{Co}_x)_3\text{O}_y$ when $x = 0.0, 0.01, 0.02, 0.04, 0.06$, and 0.08 were prep'd. by solid state reaction. Samples were sintered between $828-853^\circ$ and then quenched in liq. N. Phys. properties of the specimens were exam'd. by std. four-probe technique to det. the crit. temps. Phase identifications were performed by using x-ray diffraction technique. At a certain sintering temp., increasing the amt. of Co dopants suppressed the crit. temps.

~0 Citings

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121. Operating experience of the Southwire High-Temperature Superconducting cable project

By Hughey, R. L.; Lindsay, D.

From [AIP Conference Proceedings \(2002\), 608\(Space Technology and Applications International Forum \(STAIF 2002\)\)](#), 1117-1123. Language: English, Database: CAPLUS

A review. Southwire Company of Carrollton, Georgia in cooperation with Oak Ridge National Lab. has designed, built, installed and is operating the world's 1st field installation of a High Temp. Superconducting (HTS) cable system. The cables supply power to three Southwire manufg. facilities and part of the corporate headquarters building in Carrollton, GA. The system consists of three 30-m single phase cables rated at 12.4 kV, 1250 Amps, liq. nitrogen cooling system, and the computer-based control system. The cables are built using **BSCCO-2223** powder-in-tube HTS tapes and a proprietary cryogenic dielec. material called Cryoflex. The cables are fully shielded with a 2nd layer of HTS tapes to eliminate any external magnetic fields. The Southwire HTS cables were 1st energized on Jan. 6, 2000. Since that time they have logged over 8,500 h of operation while supplying 100% of the required customer load. To date, the cables have worked without failure and operations are continuing. The cable design has passed requisite testing for this class of conventional cables including 10x over current to 12,500 Amps and B IL testing to 110 kV. Southwire has also successfully designed and tested a cable splice. System heat loads and a.c. Losses were measured and compared to calcd. values. On June 1, 2001 on-site monitoring was ceased and the system was changed to unattended operation to further prove the reliability of the HTS cable system.

~0 Citings

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122. TEM study on the alignment of **BSCCO-2223** phase along Ag-whiskers in a bulk composite

By Bruneel, E.; Oku, T.; Penneman, G.; Van Driessche, I.; Hoste, S.

From [Key Engineering Materials \(2002\), 206-213\(Pt. 2, Euro Ceramics VII\)](#), 1473-1476. Language: English, Database: CAPLUS, DOI:10.4028/www.scientific.net/KEM.206-213.1473

2223-HTSC/ Ag-whisker composites were synthesized and the microstructure was thoroughly studied. A c-axis alignment of the ceramic phase perpendicular to the surface of Ag-whiskers was obsd. and the results of TEM, SEM, DTA and energy-dispersive x-ray anal. mapping are discussed. The onset of texturing is shown in a step by step sintering study. This revealed a dynamic process during phase formation. In TEM/HREM we obsd. an amorphous-nanocryst. phase at the interface between the superconductor and the Ag.

~0 Citings

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123. BSCCO 2223 high temperature superconductor wiring materials

By Yoo, Jae Moo

From [Chaeryo Madang \(2001\), 14\(4\), 3-8](#). Language: Korean, Database: CAPLUS

A review with 4 refs.

~0 Citings

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124. Measurement and interpretation of AC susceptibility and loss in high-temperature superconductors

By Silva, C. C.; McHenry, M. E.

From [Journal of Magnetism and Magnetic Materials \(2001\), 226-230\(Pt. 1\), 311-313](#). Language: English, Database: CAPLUS, DOI:10.1016/S0304-8853(00)01360-3

Intrinsic and hysteretic a.c. losses were studied in high-temp. superconductors. A quantum design phys. property measurement system magnetometer was used to measure a.c. susceptibility as a function of magnetic field, frequency, temp. and field history. Three types of loss mechanisms were obsd. and each assocd. with a different loss peak on the imaginary component of the a.c. susceptibility: the intrinsic, the intergranular and the intragranular peaks. The peaks change systematically with temp. and magnetic field, either in polycryst. or single crystals. YBCO polycryst. samples were prepd. by three different techniques: solid-state synthesis, melt-process melt-growth and freeze-dried and studied both as bulk and powder samples. LSCO and **BSCCO-2223** single crystals were studied and compared to polycryst. samples.

~1 Citing

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125. Development of long length high temperature superconductor wire for commercial applications

By Masur, Lawrence J.; Kellers, Jurgen

Edited By: Abbaschian, Reza; Brody, Harold; Mortensen, Andreas

From [Proceedings of the Merton C. Flemings Symposium on Solidification and Materials Processing, Cambridge, MA, United States, June 28-30, 2000 \(2001\), 471-474](#). Language: English, Database: CAPLUS

Conductors based on silver sheathed $(\text{Bi,Pb})_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_x$ (**BSCCO-2223**) are enabling commercialization of high temp. superconducting (HTS) wires. Since a breakthrough in their fabrication methodol. in 1990, work has focused on improving the supercurrent carrying ability of **BSCCO-2223** wires to levels required for practical application. Using a research approach based on understanding the relationships between processing, structure, and properties, and a process development approach based on statistical process control, superconducting performance levels sufficient for practical applications have recently been achieved via a reliable manufg. process.

~0 Citings

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126. Performance of long length BSCCO-2223 wire for magnet applications

By Masur, Lawrence J.; Scudiere, John D.

From [Science and Culture Series, Physics \(2001\), 20\(Superconducting Materials for High Energy Colliders\), 182-193](#). Language: English, Database: CAPLUS

Long length manufg. performance of **BSCCO-2223** wire has reached an av. engineering crit. c.d. (J_e) of 14,000 A/cm² (77 K, self-field, 1 $\mu\text{V}/\text{cm}$), demonstrating the tech. feasibility of long length **BSCCO** wires for com. applications. Mech. performance and robustness has reached levels close to 400 MPa crit. tensile stress and 0.5% crit. tensile strain, demonstrating the mech. reliability of **BSCCO** wires. The price/performance metric for **BSCCO** wires at 77 K, self-field is presently approx. \$300/kA-m and is projected to fall to about \$50/kA-m over the next 5 yr as manufg. vols. increase.

~0 Citings

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127. BSCCO-2223 multilayered conductors

By Martini, Luciano

From [Science and Culture Series, Physics \(2001\), 20\(Superconducting Materials for High Energy Colliders\), 173-181](#). Language: English, Database: CAPLUS

Multilayered **BSCCO-2223** composite conductors with high current capacity can be reproducibly fabricated by means of the "Accordion-Folding Method" (AFM). In this work, we report on the prepn. procedure and the elec. characterization of **BSCCO-2223** AFM conductors having suitable elec. and thermal properties for applications as current leads (CLs). Indeed, silver-gold alloy sheathed **BSCCO-2223** AFM multilayered conductors have been used for the cold-stage of 13 kA prototype CLs for CERN.

~1 Citing

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128. AC losses in perpendicular external magnetic fields in ring bundle barrier multifilamentary **BSCCO(2223)** tapes with a central resistive barrier

By Eckelmann, H.; Krelaus, J.; Nast, R.; Goldacker, W.

From [Physica C: Superconductivity and Its Applications \(Amsterdam, Netherlands\) \(2001\), 355\(3&4\), 278-292](#).

Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(01)00079-X

For the most common a.c. frequencies, the main components of the a.c. losses in multifilamentary Bi(2223) tapes are caused by both hysteresis and coupling losses. These losses can be reduced by increasing the matrix resistivity, applying a twist to the filaments and using a conductor design optimized for a practical application. In the ring bundle barrier (RBB) conductor design the authors have bundles of filaments which are twisted around a central resistive core. The RBB structure was prepd. via the powder in tube assemble and react (PITAR) route. In these tapes six bundles of seven filaments are twisted around a resistive layer of a mixt. of 50% SrCO_3 and 50% SrZrO_3 in the center of the tape. Tapes with twist lengths down to 3.4 mm were prepd. The authors present the measured a.c. losses of these tapes in external perpendicular magnetic fields. By using existing models, a description of the losses in the low B range was possible, leading to a sepn. into hysteresis, eddy current and coupling current losses. The frequency dependent loss contribution is dominated by the coupling current losses, from which the coupling current decay time const., the effective permeability, the matrix resistivity and the crit. B_c for filament coupling were extd. In tapes with a twist length <5 mm the typical loss behavior for decoupled filaments is obsd. at frequencies up to 500 Hz. Compared to the untwisted tapes, a loss redn. of up to 70% for low field amplitudes (<10 mT) was achieved.

~6 Citings

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129. Phase characterization in three monofilament **BSCCO 2223/Ag** tapes

By Lisboa, M. B.; Soares, G. d. A.; Serra, E. T.; Polasek, A.; Sike, X.

From [Materials Characterization \(2001\), 46\(1\), 75-80](#). Language: English, Database: CAPLUS, DOI:10.1016/S1044-5803(00)00097-8

The non-superconducting (non-SC) phases present in three **BSCCO** (Bi-Sr-Ca-Cu oxide) tapes have been identified. These tapes were obtained from precursor powder produced by three different routes and the microstructural characterization was conducted using SEM and X-ray diffraction. The phases: alk. earth cuprate $(\text{Ca,Sr})_2\text{CuO}_3$ (AEC 2:1), CuO and a Pb-rich phase $(\text{CaPbO}_4+(\text{Pb,Bi})_3\text{Sr}_2\text{Ca}_2\text{CuO}_x)$ were quantified using an imaging analyzer software on a cross-section after 50, 110, 170 and 230 h exposures at 820°C, which were performed between mech. pressing operations. The correlation between crit. c.d. (J_c) and non-SC phases showed that there is no direct correlations between the global quantity of non-SC phases and J_c . Moreover, a good performance appeared to be highly dependent on many other factors, such as texture alignment and non-SC distribution.

~4 Citings

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130. Preliminary study on axial-type **BSCCO** superconducting motor

By Muta, I.; Nakamura, T.; Hirata, T.; Hoshino, T.; Konishi, T.

From [Physica C: Superconductivity and Its Applications \(Amsterdam, Netherlands\) \(2001\), 354\(1-4\), 100-104](#).

Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(01)00059-4

A small axial-type **BSCCO** high- T_c superconducting motor cooled with liq. nitrogen was fabricated and tested in terms of speed, torque and speed-torque characteristic curves. **BSCCO** bulky disk was used to be 120 mm in diam. and 8 mm thick, and two-pole concd. armature winding is fed with the PWM inverter. The **BSCCO** machine could substantially operate as hysteresis motor. In the exptl. motor, M-H characteristic curves at different local points of the **BSCCO** disk were not same, air-gap magnetic flux d. was not completely sinusoidal, and viscosity losses existed due to liq. nitrogen, so that the motor could not rotate at synchronous speed. Performances were evaluated and an equiv. circuit of the **BSCCO-2223** bulk motor was estd. from test results.

~5 Citings

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131. Fatigue of a reinforced high temperature superconducting tape

By Holtz, Ronald L.; Fleshler, Steven; Gubser, Donald U.

From [Advanced Engineering Materials](#) (2001), 3(3), 131-134. Language: English, Database: CAPLUS, DOI:10.1002/1527-2648(200103)3:3<131::AID-ADEM131>3.0.CO;2-R

High-cycle fatigue-life behavior of com. multifilamentary **BSCCO 2223** powder-in-tube tape and reinforced tape was evaluated. Mech. fatigue at room temp. and 77 K, and the onset of significant supercond. degn. at 77 K were evaluated under tension perpendicular to the flat faces of the tapes. No fatigue behavior was obsd. in this transverse configuration for unreinforced tape, but fatigue-life behavior assocd. with delamination of the reinforcement was found for reinforced tape. Fatigue tolerance of the reinforced tape is very high, about 24 MPa, to at least 100,000 cycles.

~9 Citings

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132. Substitutional effect of Pb-V on **BSCCO** 110 K phase

By Bhangale, A. R.; Bhagwat, S. S.; Patil, J. M.; Shirodkar, V. S.; Raychaudhari, P.; Pai, S. P.; Purandare, S. C.; John, J.; Pinto, R.

Edited By: Mukhopadhyay, R.; Godwal, B. K.; Yusuf, S. M

From [Solid State Physics, Proceedings of the DAE Solid State Physics Symposium, 42nd, Kalpakkam, India, Dec. 20-24, 1999](#) (2000), 469-470. Language: English, Database: CAPLUS

Effect of V doping on **BSCCO** (2223) phase was studied. Two systems, viz., $\text{Bi}_{1.7}(\text{Pb}+\text{V})_{0.3}$ and $\text{Bi}_{1.5}(\text{Pb}+\text{V})_{0.5}$, were synthesized and studied using XRD and resistivity measurements. The max. T_c values for undoped samples i.e., $\text{Bi}_{1.7}$ and for $\text{Bi}_{1.5}$ system were 103 K and 98 K resp. For the 1st series highest $T_{c(\text{zero})}$ was 106 K for $V = 0.1$ and 105 K corresponding to $V = 0.2$ s series.

~0 Citings

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133. Angular effects of transport critical currents in high-temperature superconductor tapes

By Warmont, F.; Jones, H.

From [Superconductor Science and Technology](#) (2001), 14(3), 145-151. Language: English, Database: CAPLUS, DOI:10.1088/0953-2048/14/3/305

Measurements of the crit. current dependence on the angular orientation of the applied magnetic field for $(\text{Bi,Pb})_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{10}$ (**BSCCO-2223**)/AgMg-sheathed, mono-core **BSCCO-2223**/Ag-sheathed and $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_8$ (**BSCCO-2212**) dip coat tapes are presented. The authors demonstrated that the procedure of measurement is an important factor for the angular effect to show. For a magnetic field only applied during the measurement of $I_c(\theta)$ (during the rotation the magnetic field is set to zero) we found a sym. curve, while when the magnetic field is applied during the rotation the curve is asym. Also, the authors found a large difference in the crit. current value between the different procedures. From the measurements, the authors imply two conditions are necessary to have an angular effect: (1) the magnetic field must be applied during the rotation and (2) we have to start the rotation for a magnetic field parallel to the c-axis. The results are discussed in the context of the accommodation of vortices to planar defects and surface pinning.

~9 Citings

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134. Progress report on the preparation of Sb substitution for Bi and Co substitution for Cu in **BSCCO(2223)** superconductor

By Ampornrat, Pantip; Sangariyavanich, Archara

From [JAERI-Conf](#) (2000), 2000-017(Proceedings of the 1999 Workshop on the Utilization of Research Reactors), 134-138. Language: English, Database: CAPLUS

Two kinds of **BSCCO (2223)** high- T_c superconductor have been prepd., Sb substitution for Bi and Co substitution for Cu, according to the 1998 WS agreement. The Sb-doped Pb-**BSCCO (2223)** were synthesized by solid state reaction using the high purity grade chem. compds. The samples were prepd. under varying reduced O pressure and heating time. Phys. properties of specimen were tested by 4-probe technique to det. the crit. temp. and x-ray diffraction technique for phase identification. Synthesis of bulk samples for neutron scattering is being done under the best condition. The Co-doped **BSCCO (2223)** were synthesized and studied by the same methods as Sb-doped. It was found that the crit. temp. of $\text{Bi}_2\text{Sr}_2\text{Ca}_2(\text{Cu}_{1-x}\text{Co}_x)_3\text{O}_y$ when $x = 0$ is almost 100 K. Prepn. of higher amt. of Co-doping is in progress.

~0 Citings

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135. The first seconds in the magnetic relaxation on multifilamentary **BSCCO(2223)/Ag** tapes

By Zola, D.; Polichetti, M.; Pace, S.

From [International Journal of Modern Physics B \(2000\), 14\(25-27\), 2890-2895](#). Language: English, Database: CAPLUS

The 1st 60 s of the magnetization decay $M(t)$ of a multifilamentary **BSCCO/Ag** tape was studied by a vibrating sample magnetometer. Measurements were performed at 4.2-45 K and d.c. magnetic fields ≤ 11 T. The behavior in the 1st seconds after the external field is stopped are often neglected due to the presence of far from equil. magnetic states, which are function of the initial conditions or of the sample characteristics. We have obsd. a fast decay in the 1st 10 s, which was analyzed at different temps. and several external fields. Finally a possible mechanism, responsible of the obsd. behavior is discussed.

~1 Citing

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136. Hysteresis of V-I curve of **BSCCO-2223** tape

By Usak, P.; Jansak, L.; Polak, M.

From [Physica C: Superconductivity and Its Applications \(Amsterdam\) \(2001\), 350\(1&2\), 139-146](#). Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(00)01575-6

On measurement of V-I curves of **BSCCO-2223/Ag** tapes, a hysteresis was obsd. during ramping the current up and down over the I_c level. The hysteresis was not obsd. for monofilamentary tapes, but it was frequently present in multifilamentary tapes. A typical elec. field in the authors' measurements was from 10^{-5} to 10^{-1} V/m. The larger the max. of the voltage, the larger was the hysteresis effect. For a fixed max. voltage, the larger the ramping rate, the broader was the hysteresis loop. If the change in current was stopped over I_c , a relaxation of the voltage was obsd. For the ascending curve, the relaxation was neg. and voltage decreased with time when the current was held const. For the descending curve, it was pos. and the voltage increased when the current decrease was stopped. The effect was present both for short samples as well as for a tape wound in the form of a coil. The hysteresis of the V-I curves measured on short samples is suppressed by an external perpendicular magnetic field. The exact value of the field was dependent on sample type and form. In the authors' sample, this field was ~ 15 mT. A model of electromagnetic field relaxation is used to explain qual. the effect of hysteresis and its suppression by the external magnetic field.

~14 Citings

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137. Microstructural development of **BSCCO-2223** fabricated by modified two-powder process

By Ko, Jae-Woong; Yoo, Jaimoo; Kim, Hai-Doo; Chung, Hyungsik

From [Physica C: Superconductivity and Its Applications \(Amsterdam\) \(2000\), 341-348\(Pt. 3, Materials and Mechanisms of Superconductivity: High Temperature Superconductors VI, Part 3\), 2023-2024](#). Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(00)01228-4

BSCCO-2223 phase was fabricated by modified two-powder process, and investigated in terms of **2223** phase formation and grain growth. Phase evolution and reactivity of **2223** were remarkably sensitive to size of 2212 grains and liq. phase. It has been found that larger size of 2212 grains increased liq. formation temp. The Avrami relation was well suited for describing the kinetics of grain growth in **BSCCO-2223**.

~4 Citings

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138. Analysis of the DC and AC behavior of Bi₂Sr₂Ca₂Cu₃O_x tapes arranged in z-stack configuration

By Melini, A.; Tebano, R.; Mele, R.

From [Physica C: Superconductivity and Its Applications \(Amsterdam\) \(2000\)](#), 340(4), 308-316. Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(00)01511-2

The d.c. and a.c. behavior of Ag-sheathed Bi₂Sr₂Ca₂Cu₃O_x(**BSCCO-2223**) tapes, arranged in a z-stack configuration, were studied. The no. of tapes in the stack can be varied, from one (single tape) to four, as well as the inter-tape sepn. Tapes are isolated and connected in series to ensure a uniform current distribution among the tapes. The crit. currents and the av. a.c. losses per tape as a function of the transport current are measured. By increasing the no. of tapes or/and reducing the sepn. between them, the crit. current of each tape is decreased while the av. losses are increased. Tapes in a stack are electromagnetically coupled, the degree of this coupling being dependent on the sepn. among them. Theor. models are provided to explain the exptl. results.

~3 Citings

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139. Long length manufacturing of **BSCCO-2223 wire for motor and cable applications**

By Masur, L.; Podtburg, E.; Buczek, D.; Carter, W.; Daly, D.; Kosasih, U.; Loong, S. -J.; Manwiller, K.; Parker, D.; Miles, P.; et al

From [Advances in Cryogenic Engineering \(2000\)](#), 46(Pt. B), 871-877. Language: English, Database: CAPLUS

A review with 10 refs. Long length manufg. performance of **BSCCO-2223** wire has reached an av. engineering crit. c.d. (J_c) of 14,000 A/cm² (77 K, self-field, 1 μ V/cm), demonstrating the tech. feasibility of long length **BSCCO** wires for com. power applications such as cables and motors. Mech. performance and robustness has reached levels close to 400 MPa crit. tensile stress and 0.5% crit. tensile strain, demonstrating the mech. reliability of **BSCCO** wires. The price/performance metric for **BSCCO** wires at 77K, self-field is presently \approx \$300/kA-m and is projected to fall to \approx \$50/kA-m over the next 5 yr as manufg. vols. increase.

~6 Citings

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140. Properties of low thermal loss multi-filamentary **BSCCO(2223) tapes with AgMg/AgAu sheath for current leads**

By Goldacker, W.; Nast, R.; Krelaus, J.; Heller, R.; Tasca, M.

From [Advances in Cryogenic Engineering \(2000\)](#), 46(Pt. B), 785-792. Language: English, Database: CAPLUS

Mech. reinforced 37-filament-**BSCCO(2223)** tapes with a mix matrix of dispersion hardened AgMg and low thermal loss AgAu were developed, produced in long lengths (>100 m) and investigated with respect to their superconducting and mech. properties. We investigated the behavior of the crit. c.d. with varied temp. and magnetic field, under axial stress, bending strain application and thermal cycling. Tolerable axial stress values reach 180-200 MPa at corresponding strains of 0.4%. Thermal cycling between RT and 77 K did not affect the current carrying capability after 200 cycles applying different contact methods. The crit. current densities achieved are in the range of 10-15 kAcm⁻² at 77 K. Prepn. conditions, microstructure, and thermodynamical reasons seem to be responsible for the presently limited current carrying performance of these wires.

~0 Citings

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141. An HTS magnet for whole-body MRI

By Byrne, A. F.; Davies, F. J.; Raynor, C.; Stautner, W.; Steinmeyer, F.; Albrecht, C.; Kummeth, P.; Massek, P.; Neumuller, H.-W.; Wilson, M. N.

From [Institute of Physics Conference Series \(2000\)](#), 167(Applied Superconductivity 1999, Vol. 1), 1215-1218.

Language: English, Database: CAPLUS

The authors have successfully tested the 1st MRI electromagnet that uses HTS coils. The system comprises a C-shaped Fe yoke and 2 pole pieces, each energized by a coil made from **BSCCO-2223** tape, with a flux d. of 0.2 T in the 46 cm patient gap. The coils were manufd. sep. in Erlangen and Oxford, using conductor supplied by Vacuumschmelze and Nordic Superconductor Technologies, resp., as a stack of pancake coils 80 cm in diam. The operating temp. of 20 K was maintained by a sep. single stage Leybold RGS120T refrigerator for each coil.

~0 Citings

142. Scanning Hall probe imaging of multifilamentary HTS conductors: implications for AC losses

By Perkins, G. K.; Everett, J. E.; Rowe, A. C.; Stradling, R. A.; Caplin, A. D.

From [Institute of Physics Conference Series \(2000\)](#), 167([Applied Superconductivity 1999, Vol. 1](#)), 907-910. Language: English, Database: CAPLUS

The authors present high resolu. images of the magnetic remanence of multifilamentary Ag-sheathed **BSCCO 2223** tapes using a scanning Hall probe technique. Deconvolution of the magnetic image into current flow lines indicates superconducting intergrowths between filaments. These can carry of order 5% as much current as the filaments themselves and contribute significantly to the a.c. loss.

~0 Citings

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143. Angle dependency of AC losses in a **BSCCO-2223 tape - simulation and experiment**

By Shevchenko, O. A.; Rabbers, J. J.; Ten Haken, B.; Ten Kate, H. H. J.

From [Institute of Physics Conference Series \(2000\)](#), 167([Applied Superconductivity 1999, Vol. 1](#)), 879-882. Language: English, Database: CAPLUS

The magnetic field of an a.c. coil varies in amplitude, direction and time. In order to est. the a.c. loss of such a coil, a numerical model is developed that can describe a single **BSCCO-2223**/Ag tape with untwisted filaments carrying a given transport current and placed in a given transverse external magnetic field. In the network model the true current distribution is replaced with a no. of line currents and Kirchhoff equations were used instead of integrating Maxwell equations. A precisely measured V-I curve of a short sample was used as input. The model calcs. both the current distribution and the a.c. loss for an arbitrary combination of the current and magnetic field amplitude and direction. Both the current and the magnetic field may vary with time. The model is verified with exptl. data obtained at 77 K. It allows calcg. the a.c. loss at 64 K and at any intermediate temp. as well. The model is suitable to predict and evaluate the a.c. loss of high- T_c superconducting coils at typical operating parameters.

~0 Citings

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144. Surface columnar defects as a tool to tune the static and dynamic superconducting properties of HTS bulks without any damage

By Gerbaldo, R.; Castagno, G.; Ghigo, G.; Gozzelino, L.; Mezzetti, E.; Minetti, B.; Martini, L.; Cherubini, R.; Cuttone, G.

From [Institute of Physics Conference Series \(2000\)](#), 167([Applied Superconductivity 1999, Vol. 1](#)), 703-706. Language: English, Database: CAPLUS

We have studied some outstanding characteristics of the vortex confinements driven by 0.25 GeV Au-ion implantation in superconducting bulk materials, in particular in Ag/**BSCCO-2223** tapes. Surface columnar defects (SCDs), introduced only in a surface layer, are a powerful tool both to investigate vortex dynamics and to improve the performance of HTSCs without any damage of the superconducting properties. The paper shows that the flux dynamics of the whole vol. is affected in a rather controlled way. In particular, SCDs do not damage the T_c nor the irreversibility line (IL) when the field is applied perpendicular to the tracks. On the contrary, the IL with the applied field either parallel to the tracks or moderately tilted is shifted towards higher fields and temps. As a consequence, the IL anisotropy either falls to zero or is strongly reduced in a rather controllable range of magnetic fields near the dose equiv. field.

~0 Citings

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145. Multiple bending effect on AC losses of **BSCCO-2223 Ag-sheathed superconducting tapes**

By Caracino, P.; Grasso, G.; Guasconi, P.; Uglietti, D.

From [Institute of Physics Conference Series \(2000\)](#), 167([Applied Superconductivity 1999, Vol. 1](#)), 657-660. Language: English, Database: CAPLUS

AC losses of multifilament **BSCCO-2223**/Ag tapes were studied to evaluate the effect of mech. degrdn. on the tape behavior. The authors have measured at 77 K the effect of multiple double bending on the transport I_c and on the a.c. power losses at different frequencies. Assocd. to a progressive I_c degrdn. and a.c. losses increasing there is a modification of the a.c. losses curves shape that shift from a elliptical-like behavior to a strip-like one as defined by the Norris model and according to the modification of the filaments area profile.

~0 Citings

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146. Influence of strains in flat rolling on J_C of superconducting Ag/BSCCO-2223 tapes with thin, homogeneous filaments

By Bech, J. I.; Seifi, B.; Eriksen, M.; Bay, N.; Skov-Hansen, P.; Wang, W. G.

From [Institute of Physics Conference Series \(2000\)](#), 167([Applied Superconductivity 1999](#), Vol. 1), 643-646. Language: English, Database: CAPLUS

Aiming for a high Interface Perimeter Length, IPL, Ag/BSCCO tapes with thin filaments are produced. The Logarithmic Strain Ratio, LSR, in flat rolling is shown to have a great influence on J_C . The highest J_C is obtained when width strain and length strains are balanced.

~1 Citing

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147. Transport AC-losses vs. temperature and frequency in Ag-sheathed BSCCO-2223 tapes

By Tebano, R.; Melini, A.; Gomory, F.; Mele, R.

From [Institute of Physics Conference Series \(2000\)](#), 167([Applied Superconductivity 1999](#), Vol. 1), 627-630. Language: English, Database: CAPLUS

Measurement of AC losses in transport regime were performed on multifilamentary Ag-sheathed BSCCO-2223 tapes in the temp. range 63-77 K. The exptl. results show that the hysteretic losses in superconductor scale with the crit. current I_c which decreases linearly with rising temp. Measurements in the frequency range 35-280 Hz show deviation from hysteretic behavior for low values of transport current. The corresponding power losses vs. frequency fitting curves exhibit a quadratic behavior indicating an eddy current contribution. A theor. model was developed to calc. the eddy current losses in the silver sheath.

~1 Citing

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148. High-temperature superconducting current lead incorporating operation in the current-sharing mode

By Iwasa, Yukikazu; Lee, Haigun

From [Cryogenics \(2000\)](#), 40(3), 209-219. Language: English, Database: CAPLUS, DOI:10.1016/S0011-2275(00)00032-1

This paper describes a high-temp. superconducting (HTS) current lead, in which, over a short length at the warm end (e.g., 80 K), the lead, comprised of paralleled BSCCO-2223/Ag-Au tapes, is operated in the current-sharing mode. Because the authors' leads rely on cooling by the effluent helium vapor, they are applicable only to devices such as superconducting magnets that operate in a bath of liq. helium. The current-sharing mode operation results in a significant savings of the superconducting materials (BSCCO, Ag, and Au) needed to construct their leads as compared with a "fully superconducting" HTS lead of the same configuration that is rated for the same transport current and operates over the same temp. range. Detailed anal. of their four leads, each rated 6 kA and comprised of 240 paralleled BSCCO-2223/Ag-Au tapes, demonstrates that the cold-end heat input of each of their leads is equal to or can be optimized to be smaller than that of a completely superconducting counterpart comprised of 480 parallel tapes. The paper also shows that a protection criterion under the fault mode or heat exchange consideration ultimately detcs. the extent to which the material saving can be achieved in the authors' leads.

~9 Citings

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149. Bi-2223 bulk superconductor with oriented texture and high transport critical current

By Tampieri, A.; Celotti, G.

From [Superconductor Science and Technology \(2000\)](#), 13(8), 1113-1119. Language: English, Database: CAPLUS, DOI:10.1088/0953-2048/13/8/301

BSCCO (2223) superconducting powders were prep'd. by three different techniques (solid state, pyrolysis and sol-gel) and with three different stoichiometries, essentially based on variations of the Ca/Sr ratio and the Cu concn. Pressure-less sintering was performed on cold uniaxially pressed (1 GPa) samples, avoiding the drawbacks connected with hot pressing; different hot-forging cycles were then applied to attain a greater d. and orientation factor. It was found that the process phenomenol. is strictly linked to the powder starting stoichiometry: when the compn. is very near to the theor. (2223), the effects of the secondary phase extrusion are obsd. during hot forging, yielding a purifn. and inhibition of (2212) formation accompanied by an appreciable increase of J_c with respect to the hot-pressed samples. On the other hand, when the Ca/Sr ratio is considerably greater than one and the Cu excess is low, recrystn. of (2223) from the liq. takes place, with a remarkable improvement of the crit. c.d. ($J_c > 10^4$ A cm⁻²).

~8 Citings

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150. The influence of precursor powders on the phase evolution, grain size, and transport current properties of **BSCCO 2223** Ag-sheathed tapes

By Su, X.-d.; Yoo, J.-m.; Ko, J.-w.; Kim, H.-d.; Chung, H.-s.; Yang, Z. Q.; Qiao, G.-w.
From *Physica C: Superconductivity and Its Applications (Amsterdam)* (2000), 331(3&4), 285-291. Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(00)00024-1

The **BSCCO 2223** Ag-sheathed tapes were prep'd. with spray-dried precursor powders, which are of different starting conditions. The J_c in the short fully reacted tapes varied from 24-47 kA/cm² at 77 K and 0 T. The great improvement of J_c in one tape, which is characterized by the large textured Bi-2223 grains, homogeneity of reactant and fewer tracks of 2nd phases in the final superconducting matrixes, is probably a result of optimizing the precursor powder.

~10 Citings

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151. High-temperature superconductors: state of the art and future applications

By Garre, Riccardo
Edited By:Kranzmann, Axel; Gramberg, Ubbo
From *Werkstoffwoche '98, Band III: Symposium 3, Werkstoffe fuer die Energietechnik; Symposium 7, Werkstoffe und Korrosion, Munich, Sept., 1998 (1999)*, 197-204. Language: German, Database: CAPLUS

A review 13 refs. about high-T_c superconductors and the cable fabrication technologies. The oxide powder in tube (OPIT) technique for the fabrication of Ag-coated single- or multi-wire cuprate cables is described as well as the subsequent thermomech. treatments necessary for the formation of the superconducting **BSCCO-2223** phase and the healing of microcracks in the ceramic core.

~0 Citings

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152. AC magnetic field losses in **BSCCO-2223** superconducting tapes

By Lelovic, M.; Mench, S.; Deis, T.; Eror, N. G.; Balachandran, U.; Selvamanickam, V.; Haldar, P.
From *Advances in Cryogenic Engineering* (1998), 44(Pt. B), 715-722. Language: English, Database: CAPLUS

The a.c. magnetic losses at power frequencies (60 Hz) were studied for mono-and multifilament Ag-sheathed (Bi,Pb)₂Sr₂Ca₂Cu₃O_x (**BSCCO-2223**) tapes with similar I_c values at 77K. The multifilament sample exhibited higher losses than the monofilament under the same conditions. Loss peaks are discussed in terms of intergranular, intragranular and eddy current losses. Because of **BSCCO**'s anisotropy, field orientation has a large effect on the magnitude of these peaks, even at relatively small angles. Losses for fields applied parallel to the c-axis of the textured **BSCCO** grains are larger by over an order of magnitude than those applied perpendicular.

~0 Citings

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153. Progress report on the preparation of Sb-doped **BSCCO(2223)** superconductor

By Ampornrat, Pantip; Sangariyavanich, Archara
From *JAERI-Conf* (1999), 99-012, 107-111. Language: English, Database: CAPLUS

High temp. superconductors of Sb-doped **BSCCO (2223)** contg. Pb were synthesized by solid state reaction of the constituent oxides under varying reduced O pressure and heating time. The results obtained from flowing 10% O prior and after over 60 h of heating at 830° in air were closely studied. Although some impurity phases were still present in compds. fabricated by both methods, significant improvement in **2223**'s peaks intensity were obsd. in their x-ray diffraction patterns. Their crit. temps. as detd. by resistivity and magnetic susceptibility techniques ranged from 92 K - 106 K.

~0 Citings

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154. Bi(Pb)-Sr-Ca-Cu-O (**2223**) superconductor prepared by improved sol-gel technique

By Tampieri, A.; Celotti, G.; Lesca, S.; Bezzi, G.; La Torretta, T. M. G.; Magnani, G.

From [Journal of the European Ceramic Society](#) (2000), 20(2), 119-126. Language: English, Database: CAPLUS, DOI:10.1016/S0955-2219(99)00158-2

A particular sol-gel process for prepn. of **BSCCO (2223)** powder was devised, settled and tested. Water-in-oil type emulsion technique assocd. to internal gelation process was chosen, starting from the cations' nitrates. Dried powders were calcined for a few minutes at 400°C and then fired at 850°C in steps of 5 h with intermediate grindings: in only 14 h 92% pure (**2223**) phase was obtained. The mean particle size of the powders is very low (<1 µm) and the morphol. is characterized by globular grains which are both promising features for subsequent pressure sintering technique. The method appears well adaptable to large scale prodn.

~25 Citings

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155. Experimental determination of the losses produced by the interaction of AC magnetic fields and transport currents in HTS tapes

By Ashworth, S. P.; Suenaga, M.

From [Physica C: Superconductivity and Its Applications \(Amsterdam\)](#) (2000), 329(3), 149-159. Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(99)00564-X

This paper presents the results of a comprehensive series of measurements by our newly developed calorimetric technique of the ac losses in high quality **BSCCO-2223** tape. The measurements encompass the losses due to the simultaneous application of ac transport currents and ac magnetic fields of the same frequency; parallel or perpendicular to the tape. The variation of the losses with peak current, peak applied magnetic field and phase between current and field is reported. The results confirm our previously published work in that the losses can be estd. by assuming that only in the perpendicular field orientation do the self and applied fields interact and also that the equations previously developed for estg. losses hold for tapes with a wide range of crit. currents. Based on these ideas it is able to suggest equations predicting the effect of a phase difference on losses which gives reasonable agreement with measurements.

~33 Citings

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156. Granular and intergranular properties of hot pressed **BSCCO (2223)** superconductors

By Tampieri, A.; Florani, D.; Sparvieri, N.; Rinaldi, S.; Celotti, G.; Bartolucci, R.

From [Journal of Materials Science](#) (1999), 34(24), 6177-6182. Language: English, Database: CAPLUS

The effect of hot pressing conditions (sintering temp. and time) on the superconducting properties of (**2223**) Bi(Pb)SrCaCuO were studied by transport and magnetic measurements. The advancement of the densification process leads 1st to an improvement of the elec. connectivity between grains (J_c transport increases) and then to a deterioration of both intragranular and intergranular properties (T_c , J_c magnetic and J_c transport decrease) because of the induced loss of O, 2212 continuous intergrain network and other defect formation.

~3 Citings

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157. Strong vortex pinning and anisotropy in Ag/**BSCCO-2223** tapes caused by surface columnar defects

By Mezzetti, E.; Gerbaldo, R.; Ghigo, G.; Gozzelino, L.; Minetti, B.; Martini, L.; Rovelli, A.

From [Superconductor Science and Technology](#) (1999), 12(12), 1094-1097. Language: English, Database: CAPLUS, DOI:10.1088/0953-2048/12/12/314

This paper is aimed at investigating the vortex dynamics driven by 0.25-GeV Au ion implantation in Ag/BSCCO-2223 tapes. Columnar defects are produced perpendicularly to the tape plane and only affect a surface layer of about 10% of the whole sample vol. The paper shows that this defect topol. does not deteriorate the crit. temp. significantly. Moreover, the irreversibility line (IL) measured with the applied field perpendicular to the tracks is nearly unaffected. On the contrary, the IL with the applied field either parallel to the tracks or moderately tilted is shifted towards higher fields and temps. The amt. of the shift is comparable with that obtained for tracks crossing the whole sample. In a large range of magnetic fields near the dose equiv. field, the IL anisotropy falls to zero. However, the ILs after surface implantation exhibit very peculiar features.

~3 Citings

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158. Superconductor BSCCO thin films obtained by rf sputtering

By Constantin, C.; Ramer, R.; Ribco, L.; Zhao, Y.

From [Advances in Science and Technology \(Faenza, Italy\) \(1999\)](#), 23(Science and Engineering of HTC Superconductivity), 201-205. Language: English, Database: CAPLUS

The thin films of BSCCO superconducting material were off-axis deposited by RF magnetron sputtering onto MgO(100) single crystal substrates at 790°C. The thin films were annealed at 810°C in mixed atm. of 93% Ar and 7% O₂ in order to convert the last remaining traces of 2212 phase into 2223 phase. Shiny superconducting thin films of BSCCO 2223 single phase structure were obtained.

~0 Citings

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159. Enhanced superconductivity by means of "surface" columnar defects

By Mezzetti, E.; Gerbaldo, R.; Ghigo, G.; Gozzelino, L.; Minetti, B.; Caracino, P.; Gherardi, L.; Martini, L.; Curcio, F.; Zannella, S.; et al

From [Advances in Science and Technology \(Faenza, Italy\) \(1999\)](#), 23(Science and Engineering of HTC Superconductivity), 109-116. Language: English, Database: CAPLUS

The possibility to enhance in a predictable way the superconducting property behavior of a bulk material by introducing linearly correlated defects within a surface layer has been demonstrated. Ag/BSCCO-2223 tapes were irradiated by means of 0.25-GeV Au ions at different fluences, with a dose equiv. field B_φ ranging from 1 to 5 T. The implantation depth was about 15 μm and corresponds to about a 15% of the total thickness of the sample. Sample-independent enhancements of different a.c and d.c properties show up due to vortex confinement in the whole sample. The sample independence exhibited by the exptl. findings as well as, on the other side, the dose dependence of the enhancements, allow one to design in advance the performances of a monofilamentary tape where defect trenches of nanometric size are scratched.

~0 Citings

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160. The resistance of a superconducting BSCCO-2223 Ag-sheathed tape as a function of temperature, current, and magnetic field

By Paracchini, C.; Romano, L.

From [Journal of Superconductivity \(1999\)](#), 12(5), 631-639. Language: English, Database: CAPLUS

The elec. transport of a superconducting BSCCO-2223 Ag-sheathed tape is studied as a function of temp. T, current I, and magnetic field H. In a range of current and field, covering two orders of magnitude, the resistance R(T) is described by $R = R_0 \exp\{-b[(T_m - T)/(T - T_0)]^{0.5}\}$, where T₀ and T_m are the limits of the non-Ohmic and field-dependent behavior. The threshold T₀ is a decreasing function of I and H, whereas T_m depends only on H. The isothermal R(I) and the R(H) trends confirm the previous function, suggesting that, within the examd. ranges, the dissipation may be attributed to a process in which the temp. plays a prevalent role, whereas I and H change the limits of the process. The exptl. data are consistent with a process in which the dynamics of thermally generated vortices is current- and field-controlled.

~0 Citings

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161. Cuprate superconducting tapes

By Zhao, Rupeng

From [PCT Int. Appl. \(1999\), WO 9948159 A1 19990923](#), Language: English, Database: CAPLUS

A composite superconducting tape (1) comprising a plurality of stacks and diffusion bonded superconducting tapes, each comprising a filament (5) of superconducting material, for example [BSCCO-2223](#) in a Ag/Ag alloy cladding (7), such that each elongate component extends longitudinally.

~0 Citings

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162. 500 A class small AC transformer using oxide superconductor operating at liquid nitrogen temperature

By Otabe, Edmund S.; Morizane, Yasuyuki; Matsuoka, Hiroshi; Izawa, Masayuki; Matsushita, Teruo; Fujikami, Jun; Ohmatsu, Kazuya

Edited By:Koshizuka, Naoki; Tajima, Setsuko

From [Advances in Superconductivity XI, Proceedings of the International Symposium on Superconductivity \(ISS '98\), 11th, Fukuoka, Nov. 16-19, 1998 \(1999\), 2, 1393-1396](#). Language: English, Database: CAPLUS

A small superconducting transformer of the 500 A class was designed and fabricated using a Bi-[2223](#) tape for a compact a.c. current source for loss measurement. For the primary winding, a Cu wire of 0.2 mm ϕ was wound 300 turns on a 54 mm diam. bobbin. A Ag-sheathed Bi-[2223](#) multifilamentary tape with a crit. current of 45 A (77 K) was used for the secondary winding. Ten tapes, connected in parallel, were wound 2 turns to attain a sufficient secondary current. An Fe core was used to achieve good coupling between the primary and secondary windings. The peak secondary current reached 841 A at 35 Hz when the primary current was 9.28 A in liq. N. No distortion was detected in the secondary current in the frequency range of 35-2000 Hz. The a.c. current energy loss d. was measured for a Y-123 bulk superconductor prepd. by QMG method using the transformer.

~1 Citing

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163. Improvement of stabilized current density in superconducting composite conductor

By Onishi, T.; Okumura, A.; Nii, A.

Edited By:Koshizuka, Naoki; Tajima, Setsuko

From [Advances in Superconductivity XI, Proceedings of the International Symposium on Superconductivity \(ISS '98\), 11th, Fukuoka, Nov. 16-19, 1998 \(1999\), 2, 1381-1384](#). Language: English, Database: CAPLUS

The improvement of the recovery c.d. in a hybrid conductor composed of both the Cu-clad NbTi superconducting wire (LTS) and Ag-sheathed [BSCCO-2223](#) one (HTS) was studied with both the expts. and computer simulations. The conductor was modeled by an equiv. circuit consisting of a series-parallel resistive network and the stabilities under some thermal disturbance were analyzed by 1-dimensional heat balance equation. The calcd. results were well consistent with the exptl. ones. The stability in the present hybrid conductor was improved by >10%.

~0 Citings

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164. Power losses in multifilamentary Ag/BSCCO-2223 tape caused by AC external magnetic field and transport current

By Cizek, M.; Tsukamoto, O.; Miyagi, D.; Ogawa, J.; Amemiya, N.; Uyeyama, M.; Hayashi, K.

Edited By:Koshizuka, Naoki; Tajima, Setsuko

From [Advances in Superconductivity XI, Proceedings of the International Symposium on Superconductivity \(ISS '98\), 11th, Fukuoka, Nov. 16-19, 1998 \(1999\), 2, 827-830](#). Language: English, Database: CAPLUS

The authors present exptl. results of self-field energy losses in multifilamentary Ag/Bi-[2223](#) tape, carrying an a.c. transport current, in presence of an external d.c. magnetic field. The magnetic field was oriented perpendicular to the transport current flow direction and parallel to the plane of the tape. Magnetization losses due to transverse external a.c. magnetic field applied to the tape when carrying d.c. or a.c. transport current, are also reported. The measurements were carried out at 77 K and at frequency of 81 Hz. The exptl. results obtained are qual. compared to the theor. predictions of the crit. state model.

~0 Citings

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165. Stress/strain performance of sheathed bismuth-2223 superconductors

By Vasanthamohan, N.; Singh, J. P.; Khanna, G.; Lanagan, M. T.

From [Ceramic Transactions \(1998\)](#), 84(Impact of Recent Advances in Processing of Ceramic Superconductors), 195-206. Language: English, Database: CAPLUS

Besides possessing high current transport properties, superconductors employed in several applications must also be capable of retaining those properties when subjected to stresses and strains. This paper explores the potential for Consil, an alloy contg. Ag, 0.25 wt.% Ni and 0.25 wt.% Mg, to serve as a potential sheathing material in the processing of **BSCCO (2223)** superconductors. Strain tolerance measurements at 77 K and 0 T indicate superior performance by Consil-sheathed tapes over tapes sheathed in com. pure Ag. While the pure Ag undergoes an abrupt decrease in crit. current (I_c) beyond a certain strain level (0.2% strain), Consil-sheathed tapes show a more gradual decrease. However, despite their superior performance under strain, the Consil-sheathed tapes did not yield crit. c.d. (J_c) values that are normally obtained in Ag-sheathed tapes. The reason for this behavior was attributed to poor phase conversion of the superconducting core inside the Consil sheath, even after extended sintering times (250 h).

~0 Citings

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166. Self-field AC losses on Ag-BSCCO(2223) multifilamentary tapes with different filament arrangements

By Polcari, A.; Pace, S.; Dhalle, M.; Huang, Y.; Witz, G.; Marti, F.; Flukiger, R.

From [International Journal of Modern Physics B \(1999\)](#), 13(9 & 10), 1327-1332. Language: English, Database: CAPLUS

The influence of the geometrical parameters on the behavior of the a.c. losses in multifilamentary Ag-**BSCCO(2223)** tapes is being more and more evident. Recently, the effects of configurational parameters like the ratio between the overall width and thickness of tapes without barriers as well as their precise arrangements was put in evidence either theor. or exptl. With the goal to go deeper into the comprehension of this relation, the authors characterized a series of multifilamentary tapes with gradually different filament arrangements. They were measured in a self-field a.c. transport system at different frequencies, for current values up to the crit. state. The results so obtained are discussed taking into account of some theor. models.

~1 Citing

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167. Experimental investigations on the critical vortex dynamics with controlled disorder

By Crescio, E.; Gerbaldo, R.; Ghigo, G.; Gozzelino, L.; Mezzetti, E.; Minetti, B.; Martini, L.; Ottoboni, V.; Caracino, P.; Gherardi, L.; et al

From [International Journal of Modern Physics B \(1999\)](#), 13(9 & 10), 1137-1142. Language: English, Database: CAPLUS

The possibility to enhance in a predictable way the superconducting properties behavior of a bulk material by introducing linearly correlated defects within a surface layer was demonstrated. Ag/**BSCCO-2223** tapes were irradiated by 0.25 GeV Au ions at different fluences, with a dose equiv. field B_{22} ranging from 1 T to 5 T. The implantation depth was $\sim 15 \mu\text{m}$ corresponding to $\sim 15\%$ of the total sample thickness. Sample independent enhancements of different a.c and d.c properties show up, due to vortex confinement in the whole sample. The sample independence exhibited by all the exptl. findings as well as, on the other side, the dose dependence of the enhancements, allow to design in advance the performances of a monofilamentary tape where defect trenches of nanometric size are scratched.

~0 Citings

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168. Synthesis of BSCCO-2223 by sol-gel processing: thermodynamic analysis

By Pereira, Luiz A. A.; Ogasawara, Tsuneharu; Nobrega, Maria Cecilia

From [Congresso Anual - Associacao Brasileira de Metalurgia e Materiais \(1998\)](#), 52nd(II Congresso Internacional de Tecnologia Metalurgica e de Materiais), 4691-4702. Language: Portuguese, Database: CAPLUS

The verification of thermodyn. viability for formation of **BSCCO-2223** superconductors under sol-gel processing conditions was made using as its basis the superposition of $\text{p}a_i\text{-pH}$ (a_i representing the chem. activities of metallic elements) obtained using HSC Chem. for Windows 2.0. The phenomenon of incomplete elimination of the carbon and problems arising from the gas bubbles in the final ceramic were analyzed in terms of the difficulty of water and alc. elimination due to capillary retention in the gel pores. A complete thermodyn. anal. of the $\text{pH}_2\text{O(g)}\text{-T}$, $\text{pCO}_2\text{(g)}\text{-T}$ and $\text{pO}_2\text{-T}$ diagrams was made in terms of the calcining and reaction of the components and their conversion into the final ceramic. The shift of the molar proportion CaO_2/CaO from 1.0 to 1.5 requires a huge increase in the pO_2 of the reacting system at the synthesis temp. of the superconductive ceramic.

~0 Citings

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169. Measurement of the transport current distribution in a superconducting tape

By Usak, P.

From [Physica C: Superconductivity and Its Applications \(Amsterdam\) \(1999\)](#), 316(3&4), 229-233. Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(99)00283-X

A non-destructive measurement method was applied to evaluate transport current distribution across the width of a superconducting tape. The self-magnetic field over the tape was mapped at a small distance from it. This provided input data for an inverse calcn. process through which the current distribution was evaluated. The procedure was used to det. the dynamics of the distribution of AC current in a WIT **BSCCO 2223** tape at a zero external magnetic field. A different behavior was obsd. for the unsatd. and satd. regimes. The crit. current distribution was also detd. for transport current $I=I_c$. The measurement on the WIT **BSCCO 2223** tape showed that at the crit. current, the current capacity in the central section was higher than that at the edges.

~12 Citings

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170. High-temperature superconductor

By Garre, Riccardo

From [Metall \(Heidelberg\) \(1999\)](#), 53(4), 206-208. Language: German, Database: CAPLUS

A review without refs. about high- T_c superconductors and the cable fabrication technologies. The oxide powder in tube (OPIT) technique for the fabrication of Ag-coated single- or multi-wire $\text{Bi}_2\text{Ca}_2\text{Sr}_2\text{Cu}_3\text{O}_x$ cables is described as well as the subsequent thermomech. treatments necessary for the formation of the superconducting **BSCCO-2223** phase and the healing of microcracks in the ceramic core.

~0 Citings

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171. Measurement of a.c. losses in superconductors due to a.c. transport currents in applied a.c. magnetic fields

By Ashworth, S. P.; Suenaga, M.

From [Physica C: Superconductivity \(Amsterdam\) \(1999\)](#), 313(3&4), 175-187. Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(98)00634-0

A new technique for the measurement of a.c. losses in superconductors due to applied magnetic fields and transport currents is reported. This technique is derived from consideration of the source of the energy losses, rather than by the imposition of any model for magnetic field distribution within the superconductor and allows us to present new data on the losses in **BSCCO-2223** multi-filamentary conductor due to a.c. fields and d.c. currents, or due to a.c. fields and a.c. currents. Based on these measurements we provide guidelines for estg. the losses in **BSCCO-2223** conductors.

~37 Citings

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172. Optimization of annealing condition to grow high T_c **BSCCO** thick films by screen printing technique

By Nimal, A. T.; Khare, Sangeeta; Khare, Neeraj; Gupta, A. K.

From [Indian Journal of Cryogenics \(1995\)](#), 20(1), 10-12. Language: English, Database: CAPLUS

Optimization of two step heat treatment for growing thick films of Bi-Sr-Ca-Cu-O (**BSCCO**) **2223** phase with T_C ($R = 0$) = 112K is described. **BSCCO** 1112 starting compn. is taken for the prepn. of thick films by screen printing technique. The films are given two step heat treatment. The growth mechanism of the high T_C phase is discussed in terms of R-T and XRD studies. T_C ($R = 0$) increases from around 77K to 112K and then showing a decreasing trend as the 2nd step duration, is further increased.

~0 Citings

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173. Filament architectures in AC conductors: the influence of intergrowths

By Everett, J.; Perkins, G.; Volkozub, A. V.; Caplin, A. D.; Dhalle, M.; Polcari, A.; Marti, F.; Huang, Y. B.; Flukiger, R.
From *Physica C: Superconductivity (Amsterdam)* (1998), 310(1-4), 202-207. Language: English, Database: CAPLUS,
DOI:10.1016/S0921-4534(98)00462-6

Filament isolation is an extremely important factor in multi-filamentary conductors, and attempts have been made to achieve this by incorporating a resistive oxide sheath around individual filaments. However, filament-bridging intergrowths have been obsd. in conductors with and without the resistive sheath. The authors present magnetization results on **BSCCO-2223**/Ag conductors with different filament configurations, and analyze the data taking into account the effects of magnetic coupling between filaments. All samples studied display some degree of filament bridging.

~11 Citings

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174. AC transport and magnetic characterization of multifilamentary Ag-**BSCCO**(**2223**) tapes with different filament arrangements

By Polcari, Albino; Dhalle, Marc; Marti, Frank; Witz, Gregoire; Huang, Yibing; Flukiger, Rene
From *Physica C: Superconductivity (Amsterdam)* (1998), 310(1-4), 177-181. Language: English, Database: CAPLUS,
DOI:10.1016/S0921-4534(98)00457-2

AC losses in multifilamentary tapes depend on various parameters. Among them, geometrical factors such as overall tape width and thickness as well as the precise arrangement of the filaments are expected to have an important influence. Several theor. models describe this dependency. In order to study these geometrical effects exptl., the authors prepd. a series of Bi(**2223**)/Ag tapes with gradually changing filament arrangements and tape aspect ratio, and characterized them by AC transport and magnetic measurements. The results are compared to model predictions.

~7 Citings

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175. Fabrication and electromechanical characterization of silver-clad **BSCCO** tapes

By Iyer, A. N.; Salib, S.; Mironova, M.; Vipulanandan, C.; Balachandran, U.; Salama, K.
From *Journal of Superconductivity* (1998), 11(5), 533-543. Language: English, Database: CAPLUS

The powder-in-tube technique consisting of industrial processes such as wire drawing and rolling has been widely used to fabricate superconducting tapes. In the present investigation a novel technique was adopted to fabricate **BSCCO 2223** tapes. Instead of wire drawing, the silver billet was reduced in size by groove rolling. Stress conditions during groove rolling were analyzed and appropriate changes were incorporated to optimize the deformation process. Subsequent thermomech. treatment resulted in tapes with av. crit. current densities of 18,000 A/cm². Phase development and microstructural evolution during the thermomech. treatment were studied using XRD, SEM, and TEM. The electromech. properties of monofilament and composite **BSCCO** tapes were evaluated by subjecting them to in situ tensile tests. The strain tolerance of the composite was found to be better than that of the monofilament **BSCCO** tape.

~4 Citings

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176. An improved method to determine weight fraction of 2212 and 2201 phase impurities in **BSCCO-2223** powders from x-ray powder diffraction peaks

By Schmahl, W. W.; Lehmann, M.; Rath, S.; Gerards, M.; Riddle, R.
From *Superconductor Science & Technology* (1998), 11(11), 1269-1276. Language: English, Database: CAPLUS,
DOI:10.1088/0953-2048/11/11/013

The authors propose a std. operating procedure for the estn. of the amt. of 2212 and 2201 phases in a **2223** PBSCCO HTSC powder, based on one to two obsd. x-ray powder diffraction intensities for each phase. The quant. phase anal. takes into account the effects of preferred orientation, structure factor magnitude and particle absorption contrast. The procedure is derived from Rietveld anal. of the full diffractogram.

~15 Citings

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177. On the dynamics of vortices in **BSCCO(2223)/Ag** tape

By Galkin, A. Yu.; Pust, L.; Jirsa, M.; Nalevka, P.; Koblishka, M. R.

From *Physica C: Superconductivity (Amsterdam)* (1998), 308(1&2), 21-24. Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(98)00517-6

Magnetic relaxation measurements in BSCCO(**2223**)/Ag rolled tape were performed at different temps. and magnetic fields applied along the c-axis. The crossover in vortex dynamics has been found on the temp. dependence of the activation energy U_0 . It is argued that the crossover T^* might be assocd. with the melting of the two-dimensional vortex lattice.

~3 Citings

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178. Calorimetric methods for measuring AC losses in HTSC tapes carrying currents

By Hardono, T.; Cook, C. D.; Jin, J. X.

From *Superconductor Science & Technology* (1998), 11(10), 1087-1090. Language: English, Database: CAPLUS, DOI:10.1088/0953-2048/11/10/041

Power engineering applications of HTSC tapes are often restricted by a.c. losses. Both direct and indirect methods were used to measure a.c. losses in short samples. This paper reports on the development of a direct calorimetric method for a.c. loss measurement techniques for short tapes based on measurements of slight temp. increases of the sample. This method has the advantage of measuring total losses in the HTSC sample. The test rig discussed here consists of a calorimeter and assocd. data collection and anal. equipment. The calorimeter uses a sensitive temp. sensor and an ohmic heater, needed for the calibration of the system, surrounded by a thermal insulator. A Pt sensor was used which works at 77 K and may be used in a magnetic field. Sensors and controlled variables are interfaced to the controlling computer via IEEE interfaces. The power loss of a sample carrying a.c. was measured with a high accuracy using this exptl. set-up. The sample is a seven-filament **BSCCO-2223** tape. The effect of the frequency and amplitude of the signal has easily and quickly been analyzed.

~2 Citings

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179. Multi-step process to prepare bulk **BSCCO (2223)** superconductor with improved transport properties

By Tampieri, A.; Calestani, G.; Celotti, G.; Masini, R.; Lesca, S.

From *Physica C: Superconductivity (Amsterdam)* (1998), 306(1&2), 21-33. Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(98)00353-0

BSCCO (2223) superconducting powders were prepd. by three different techniques (solid state, pyrolysis and sol-gel) and with three different stoichiometries, esp. based on variations of Ca/Sr ratio and Cu concn. Pressureless sintering was performed on cold uniaxially pressed (1 GPa) samples, avoiding the drawbacks connected to hot-pressing; different hot-forging cycles were then applied to attain higher d. and orientation factor. It was found that the process phenomenol. is strictly linked to the powder starting stoichiometry: when compn. is very near to the theor. (**2223**), effects of secondary phase extrusion are obsd. during hot-forging, yielding a purifn. and inhibition of (2212) formation accompanied by an appreciable increase of J_c respect to hot-pressed samples. When a Ca/Sr ratio is considerably >1, recrystn. of (**2223**) from the liq. takes place, with a remarkable improvement of crit. c.d. ($J_c > 10^4$ A/cm²). In this case the non-superconducting secondary phases act as intrinsic oxygen reservoir. Finally, when compn. diverges even more from (**2223**) (Ca/Sr » 1 and Cu excess), the formation of too many ppts. of non-superconducting phases hinders the texturing process and more in general deteriorates the intergranular properties.

~14 Citings

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180. Crystal growth dependence on the starting chemical compounds in the Bi₂Sr₂Ca₂Cu₃O_x system

By Manfredotti, C.; Truccato, M.; Volpe, P.; Benzi, P.; Rizzi, N.; Sanguinetti, S.; Allasia, D.
From [Physica C: Superconductivity \(Amsterdam\)](#) (1998), 303(1&2), 94-100. Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(98)00241-X

The authors have studied the prodn. of the **BSCCO 2223** phase by using four different types of starting chem. compds. with the same thermal treatment. Samples were characterized in various aspects, and the **2223** phase vol. fractions were accurately detd. by applying the effective medium theory to magnetic susceptibility measurements. Polycryst. samples are well described by the spherical inclusion granular model, and that org. precursors strongly inhibit the prodn. of the **2223** phase with respect to inorg. ones.

~3 Citings

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181. Effects of surface heavy ion implantation on Ag/BSCCO-2223 tapes

By Gerbaldo, R.; Ghigo, G.; Gozzelino, L.; Mezzetti, E.; Minetti, B.; Caracino, P.; Gherardi, L.; Cherubini, R.
From [Materials Science & Engineering, B: Solid-State Materials for Advanced Technology](#) (1998), B55(1,2), 109-113. Language: English, Database: CAPLUS, DOI:10.1016/S0921-5107(98)00189-5

The effects of surface 0.25 GeV Au ion implantation on the superconductive properties of Ag/BSCCO-2223 tapes are studied. Columnar-defect length was ~5% of the whole sample thickness. Strong localization phenomena and the occurrence of the localization characteristic kink in the irreversibility line, IL, are obsd. at a point phase (B_{kink} , T_{kink}). Large shift of this line towards higher fields and temps. and a very substantial enhancement of the crit. c.d., J_c , have been found. IL anisotropy and J_c anisotropy of the irradiated samples are switched off up to fields higher than B_{kink} . The characteristic trends, as well as their dose dependencies, are particular of such pinning strategy. The results give useful hints for further improvement of the Bi-2223 tape technol., concerning the introduction and influence of appropriate surface pinning.

~0 Citings

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182. Magnetic and electric simulation of eddy currents in Ag sheathed Bi2223 tapes

By Nibbio, Nadia; Stavrev, Svetlomisir; Dutoit, Bertrand
Edited By: Osamura, Kozo; Hirabayashi, Izumi
From [Advances in Superconductivity X, Proceedings of the International Symposium on Superconductivity, 10th, Gifu, Japan, Oct. 27-30, 1997](#) (1998), 2, 1369-1372. Language: English, Database: CAPLUS

The authors present a Finite Elements Method electromagnetic simulation of the c.d. and magnetic field distributions in Ag sheathed **BSCCO (2223)** tapes at 59Hz and 1kHz. To carry out the electromagnetic simulation the authors have characterized the elec. and magnetic properties of the superconductor using a simple model of the tape. The Ac losses due to eddy currents in the silver sheath are calcd. for a mono and a multicore tape.

~0 Citings

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183. AC losses of high-T_c superconductor for power cables

By Mukoyama, S.; Ishii, H.; Honjo, S.; Iwata, Y.; Miyoshi, K.; Tsubouti, H.; Yoshida, T.; Mimura, M.; Uno, N.
Edited By: Osamura, Kozo; Hirabayashi, Izumi
From [Advances in Superconductivity X, Proceedings of the International Symposium on Superconductivity, 10th, Gifu, Japan, Oct. 27-30, 1997](#) (1998), 2, 1259-1262. Language: English, Database: CAPLUS

HTS power cable is expected as the future power transmission line to supply elec. power to major population centers. If compact HTS cables cooled by liq. N are realized, facility costs would be greatly reduced, and more effective use of the densely occupied underground space could be made. One of the important technologies concerning the compact cable is to reduce a.c. losses. Therefore, a 5-m-long superconductor was prepd. by winding **BSCCO-2223/Ag**-sheath tapes around a forming core into an insulated multilayer structure, and a.c. losses were measured with the a.c. transport method. It was demonstrated that a.c. losses of the conductor are significantly reduced by making the current uniform in each layer.

~1 Citing

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184. Strain tolerance of Ag-sheathed BSCCO (2223) superconductors with various geometrical configurations

By Vasanthamohan, N.; Singh, J. P.; Lubke, K. A.

From [Superconductor Science & Technology](#) (1998), 11(6), 584-589. Language: English, Database: CAPLUS, DOI:10.1088/0953-2048/11/6/007

Strain tolerance (retained crit. current as a function of applied strain) of Ag-sheathed monofilament and wire-in-tube (WIT) $\text{Bi}_{1.8}\text{Pb}_{0.4}\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_x$ tapes sintered for various time periods was evaluated. Strain tolerance of the WIT tapes sintered for 100 h was significantly lower than that of the monofilament tapes. This is attributed to a sharp increase in vol. fraction of the superconducting core in WIT tapes (compared with that in monofilament tapes) subjected to a strain value greater than the fracture strain of BSCCO ($\approx 0.2\%$). This limitation was overcome by fabricating tube-within-tube tapes contg. an addnl. BSCCO layer that runs along the neutral plane. Strain tolerance of these was superior to those of both the monofilament and the WIT configurations. This improvement is related to crack pinning effects induced by the inner Ag tube and by increased vol. fraction of undamaged superconducting core. The effective strain experienced by the current-carrying regions of the cross-section will det. the strain tolerance of the tape. At strains $<1\%$ where there is a significant decrease in the vol. fraction of superconducting core within subcrit. strain, only a relatively low decrease in crit. c.d. was obsd., indicating possible current shunting in all of the tape configurations studied.

~7 Citings

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185. Fabrication of superconducting joints between 61 filaments of BSCCO 2223 tapes

By Kim, Cheol-Jin; Pak, Sung-Chang; Yoo, Jae-Moo

From [Yoop Hakhoechi](#) (1998), 35(2), 137-144. Language: Korean, Database: CAPLUS

High-temp. superconducting joints between 61 filaments of Bi-2223 tapes were fabricated by chem. corrosion and repeated thermomech. process. The silver sheath of the superconducting tape was chem. removed using chem. etchant ($\text{NH}_4\text{OH}:\text{H}_2\text{O}_2=1:1$) from one side of each tape without altering the form of lap joint. The joined region was formed by uniaxial pressing and a series of thermomech. process and then subjected to properties measurement and microstructural anal. The crit. current (I_c) variation and I-V characteristics along the joint in the multifilament tape which limit the total current carrying capacity of the superconducting tape was higher than that of monofilament tape. But the transition exponent n-value of the multi-filament tape was lower than that of monofilament wire due to the interaction of the individual superconducting core of the multi-filament. The crit. current through the joint area was improved by repeated press and reaction annealing treatment.

~0 Citings

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186. A new bolometric method to measure AC losses in short HTS tapes

By Chakraborty, N.; Volkozub, A. V.; Caplin, A. D.

Edited By: Zhou, Lian; Weber, Harald W.; Collings, E. W

From [Critical Currents in Superconductors for Practical Applications, Proceedings of the International Workshop, Xian, Peop. Rep. China, Mar. 6-8, 1997](#) (1998), 197-200. Language: English, Database: CAPLUS

Compared with voltage measurements, bolometric measurements of the AC loss are intrinsically more reliable. However, previous bolometric approaches required rather long lengths of conductor, and so were less suitable for prototype conductors. A novel bolometric technique was developed to be used with samples only a few cm. in length, and in a prototype form having a sensitivity of a few $\mu\text{W}/\text{cm}$. Its utility is demonstrated using the loss data obtained for a BSCCO2223 tape.

~0 Citings

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187. Supercurrent conduction mechanisms in BSCCO-2223 tapes

By Malozemoff, A. P.; Riley, G. N., Jr.; Fleshler, S.; Li, Q.

Edited By: Zhou, Lian; Weber, Harald W.; Collings, E. W

From [Critical Currents in Superconductors for Practical Applications, Proceedings of the International Workshop, Xian, Peop. Rep. China, Mar. 6-8, 1997](#) (1998), 32-39. Language: English, Database: CAPLUS

Supercurrent conduction mechanisms in BSCCO-2223 tapes are reviewed with 26 refs., including the earlier "brick wall" and "railway switch" models, and the new "freeway" model. Conduction through edge colony boundaries is proposed as a significant mechanism, facilitated by c-axis current redistribution. These are likened to bottle-necked rotary junctions and lane changes, resp. These phenomena, coupled with mosaic spread, explain a variety of data.

~6 Citings

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188. Anisotropy of E(I) characteristics of Ag-sheathed BSCCO tapes with respect to external magnetic field

By Usak, P.; Jansak, L.; Chovanec, F.

From *Applied Superconductivity* (1998), 4(12), 577-581. Language: English, Database: CAPLUS, DOI:10.1016/S0964-1807(97)00045-8

Because of the macroscopic form of Ag-sheathed BSCCO-2223 tape conductors, as well as internal structure of grain build up and their mutual orientation within the Ag sheath, their volt-ampere characteristics are not isotropic with respect to external magnetic field orientation. For the same abs. field values the behavior of E(I) curves are a sensitive gauge of vector B inclination to tape axis and to the surface plane. As a result of the proximity effect and the weak links structure, the increasing external magnetic field reduces overall integral current capacity of the sample. The effect is pronounced at a perpendicular orientation of B but an analogic picture is obsd. for planar orientation with a corresponding shift of E(I) curves to higher current levels. For selected and gradually increasing levels of external magnetic field the difference in the vector B, parallel and perpendicular inclination with respect to tape plane on E(I), characteristics are presented. In this way the anisotropy manifestation at the different field levels is studied. The field vector remains perpendicular to tape axis. Also revealed is the influence of thermal cycling on E(I) through the thermomechanically induced cracking process.

~0 Citings

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189. Influence of vanadium oxide on BSCCO (2223) phase formation and related properties

By Tampieri, A.; Celotti, G.; Monteverde, F.; El-Tantawy, F.; Mansour, S. A.

From *Journal of Materials Science* (1998), 33(7), 1857-1862. Language: English, Database: CAPLUS, DOI:10.1023/A:1004305421744

The prepn. of BSCCO 2223 superconducting powder was studied with addn. of V_2O_5 ranging from 0.3 to 0.5 M index. Various compns. were prepd. both contg. and without Pb and subsequently treated with different firing cycles, to promote the incorporation in lattice sites of vanadium atoms. Different densification procedures were attempted and final bulk samples characterized to evaluate microstructural, mech. and elec. properties. The addn. of vanadium was found to increase the formation rate of high T_c phase and about 90% of 2223 phase has been obtained in 80 h. However, this element was found to present an outstanding segregation trend at grain boundaries (esp. with Sr) and to be responsible of a marked delay in 2223 phase formation in respect to lead-doped samples. Transport properties seem pos. affected even if considerable contamination at grain boundary and lowering in offset crit. temp. are unavoidable.

~2 Citings

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190. "Electromaglev"-magnetic levitation of a superconducting disk with a dc field generated by electromagnets: Part 1. Theoretical and experimental results on operating modes, lift-to-weight ratio, and suspension stiffness

By Iwasa, Yukikazu; Lee, Haigun

From *Cryogenics* (1998), 37(12), 807-816. Language: English, Database: CAPLUS, DOI:10.1016/S0011-2275(97)00082-9

The authors present results of a comprehensive study, both theor. and exptl., of an electromaglev system, in which a high-temp. superconducting bulk sample, e.g. $YBa_2Cu_3O_{7-\delta}$ (YBCO), is levitated stably in a d.c. magnetic field generated by electromagnets placed underneath the floating object. Results of the zeroth-order theory agree quite well with exptl. results on lift-to-wt. ratio and suspension stiffness for three bulk samples: (1) a solid YBCO disk; (2) a YBCO annulus; and (3) a YBCO annulus with a neodymium-iron-boron (Nd-Fe-B) permanent magnet disk (PMD) filling the center. The expt. has also verified the need to satisfy two requirements to achieve stable levitation with a d.c. magnetic field only: (1) the spatial flow of the supercurrent in the sample must have at least two degrees of freedom; and (2) the electromagnets must generate a magnetic field profile that satisfies spatial requirements for lateral and pitch stability. A permanent magnet disk has only one degree of freedom for its Amperian current, thus it cannot be levitated stably in this system; the expt. also demonstrated that an HTS solenoid (wound with silver-sheathed BSCCO-2223 tape) cannot be levitated stably, because the solenoid supercurrent flow is also restricted to the azimuthal direction only. The zeroth-order theory together with the Bean model shows that the supercurrent induced in a YBCO sample is independent of the crit. c.d., J_c , of the material but is directly proportional to the axial component of the field and that the lift of the sample is directly proportional to the product of the axial and radial components of the magnetic field generated by the electromagnets.

~21 Citings

191. Two-dimensional normal zone propagation in BSCCO-2223 pancake coils

By Lim, Hunwook; Iwasa, Yukikazu

From [Cryogenics](#) (1998), 37(12), 789-799. Language: English, Database: CAPLUS, DOI:10.1016/S0011-2275(97)00095-7

We present the results of an exptl. and anal. study of two-dimensional normal zone propagation in pancake test coils, wound with silver-sheathed BSCCO-2223 tapes. Two test coils were studied in detail, one having three and the other eight layers. Each test coil was housed in an adiabatic environment whose temp. (20-70 K) was controlled and maintained by a two-stage G-M cryocooler and placed in a background field (0-6 T) generated by a Bitter magnet. With a test coil carrying a transport current (0-200 A), a local heat disturbance was applied by a heater attached to the outermost layer of the coil. The resulting elec. and thermal responses of the coil were recorded with voltage taps and thermometers attached to the coil. A normal zone propagation code was developed to accurately simulate the voltage and temp. responses of each coil for both quenching and recovering events. The code solves the nonlinear transient heat diffusion equation in two-dimensional cylindrical coordinates with a finite difference method. As an application of this code, a two-coil system, with each coil comprised of one double pancake wound with silver-sheathed BSCCO tape, was studied for its quench behavior as one of the coils was driven normal locally. The simulation results indicate that the value of a shunt resistor connected across the terminals of each coil has a profound effect on the level of hot-spot temp. reached in the quench initiation spot.

~28 Citings

192. Normal zone propagation studies on a single pancake coil of multifilamentary BSCCO-2223 tape operating at 65 K

By Penny, M.; Beduz, C.; Yang, Y.; Manton, S.; Wroe, R.

From [Institute of Physics Conference Series](#) (1997), 158(Applied Superconductivity 1997, Vol. 2), 1551-1554.

Language: English, Database: CAPLUS

Normal-zone propagation and stability measurements were performed on a single pancake coil made from BSCCO-2223 multifilamentary tape. The coil composite was held above a subcooled N bath at 65 K. The majority of the cooling was by conduction of the Cu-links which thermally connect the coil's inner and outer turns to the bath temp. The combination of impregnated single pancake and cooling conditions simulate a long potted solenoid, where the cooling of the center turn was dominated by the low thermal cond. between adjacent turns ($K_{rz} = 0.8 \text{ m}^{-1}\text{K}^{-1}$ at 77 K). The normal zone stability was studied using heated regions of various lengths and power inputs. The total energy required to initiate a min. propagation zone (E_{mpz}) reduces as the length of the heated region decreases. For example, $E_{mpz} = 2.8\text{J}$ and 4.7J for heater lengths of 2.5 cm and 14.6 cm, resp. The velocity of the normal zone in the transverse direction was 1.2 ms^{-1} after a energy pulse of 5.7 J was applied over a 12.5 cm length. If the zone was undetected then the quench would have damaged the coil by ohmic heating. Therefore, careful magnet design may be required for HT_c devices with the further development of high- I_c superconductors.

~2 Citings

193. Critical current and self-field loss of BSCCO-2223/Ag tape in bifilar geometry

By Huang, Y. K.; Rabbers, J. J.; Shevchenko, O. A.; Ten Haken, B.; Ten Kate, H. H. J.

From [Institute of Physics Conference Series](#) (1997), 158(Applied Superconductivity 1997, Vol. 2), 1429-1432.

Language: English, Database: CAPLUS

The crit. current and self-field loss of BSCCO-2223/Ag tapes in bifilar geometry are investigated and compared to those in a single tape. The crit. current in a bifilar tape at 77 K and zero external field is found to be 15 ~ 20% higher than that of a single tape. The increase of crit. current is attributed to the substantial redn. of the self-field component perpendicular to the tape. The self-field loss in a bifilar geometry is much lower due to the changes of self-field magnitude and distribution in the tape.

~2 Citings

194. A.C. losses in Bi-2223 tapes for power applications

By Gherardi, Laura; Gomory, Fedor; Mele, Renata; Coletta, Giacomo
From [Institute of Physics Conference Series \(1997\), 158\(Applied Superconductivity 1997, Vol. 2\), 1371-1376.](#)
Language: English, Database: CAPLUS

Improved measuring procedures and interpretation efforts have shown that the crit. state model is fully applicable to describe the behavior of HTS tapes for power applications. This could consistently analyze magnetic and transport measurements, and study possible inhomogeneities and geometrical peculiarities in **BSCCO-2223** tapes. Examples of such anal. are given in this contribution. Losses in multistrand conductors require a more complex model and further development of the exptl. procedures; the results of ac transport measurements on a 13m long, multilayer, prototype conductor sample, are also discussed here.

~4 Citings

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195. Processing and superconducting properties of Ag-Ti-Cu alloy-sheathed BiSrCaCuO tapes

By Miao, H.; Artigas, M.; De La Fuente, G. F.; Iriarte, F.; Navarro, R.
From [Institute of Physics Conference Series \(1997\), 158\(Applied Superconductivity 1997, Vol. 2\), 1331-1334.](#)
Language: English, Database: CAPLUS

Monofilamentary **BSCCO 2223** tapes have been produced by the powder in tube method using Ag 10 wt% (Cu-Ti) alloy sheaths. There is an increase of hardness which improve the uniformity of the tapes, but also produces microstructural changes by the diffusion of Ti and Cu. The influence of the alloy compn. on the crit. c.d. of the final tapes has been analyzed. Crit. temps. higher than 108 K (onset) and J_c values up to 6.2 kA/cm² at 77 K in the self field have been obtained for 5 wt% Ti, 5 wt% Cu silver alloyed tapes.

~2 Citings

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196. Limits of application of the **BSCCO** conductors

By Lehdorff, Beate; Hortig, Michael; Kurschner, Hans-Gerd; Polak, Milan; Wilberg, Rainer; Wehler, Dorothea; Piel, Helmut
From [Institute of Physics Conference Series \(1997\), 158\(Applied Superconductivity 1997, Vol. 2\), 1303-1306.](#)
Language: English, Database: CAPLUS

One important limitation of the crit. c.d. in **BSCCO**-based superconducting wires and tapes is caused by the inhomogeneity of the ceramic core. Anal. of current-voltage-characteristics of **BSCCO-2212** wires and **-2223** tapes exhibit scaling behavior only below T_g . Also the I-V-curves behave very different for **BSCCO-2212** wires with and without Ag sheath. This is caused by current sharing in the metal cladding due to nonuniform cross sectional area and poor grain connectivity. Hall probe scans were used to demonstrate bad areas in **BSCCO-2223** tapes. In addn. ac-susceptibility expts. as a function of temp. reveal the quality of grain connectivity.

~0 Citings

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197. Properties of Bi(**2223**)/Ag Au multifilamentary tapes for current leads

By Goldacker, W.; Ullmann, B.; Gabler, A.; Heller, R.
From [Institute of Physics Conference Series \(1997\), 158\(Applied Superconductivity 1997, Vol. 2\), 1223-1226.](#)
Language: English, Database: CAPLUS

BSCCO(2223) tapes for application in current leads for superconducting coils need replacement of the pure Ag sheath through a low thermal conduction material as AgAu alloy to achieve reduced thermal losses compared to conventional current leads. Seven-filamentary **BSCCO** tapes with Ag₉₂Au₈ alloy sheaths were prep'd., and crit. current densities J_c up to 11 kA cm⁻¹ at 77 K were achieved. The $J_c(B,T)$ behavior indicates a nearly pure Bi(**2223**) phase, but compared to Ag-sheathed tapes a stronger J_c degrdn. with fields presumably due to a worse texture of the **BSCCO** phase. The mech. data characterized by I_c vs. axial tensile stress investigation and a special distortion expt. demonstrate that AgAu sheaths are mech. weaker than Ag sheaths with an insufficient performance for tech. applications. These tape properties are discussed with respect to the application aspects in a 1 kA current lead.

~3 Citings

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198. Evaluation of HTS samples for 12.5 kA current leads

By Teng, Marc; Ballarino, Amalia; Herzog, Robert; Ijspeert, Albert; Timlin, Ciaran; Harrison, Stephen; Smith, Kevin
From [Institute of Physics Conference Series \(1997\), 158\(Applied Superconductivity 1997, Vol. 2\), 1203-1206](#).
Language: English, Database: CAPLUS

The Large Hadron Collider will require the conduction of more than 3400 kA between room temp. and 1.8 K. To reduce the heat load into the liq. He, a development program was started on current leads with HTS sections. This paper reports on the evaluation of HTS samples for 12.5 kA from a no. of suppliers. The tests were performed in a purpose built assembly, with the main criteria being current carrying capacity, heat conduction and quench behavior. Results show the viability of HTS components in high-current leads, although further engineering efforts are required for some aspects.

~1 Citing

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199. Critical current density and irreversibility line of [2223 BSCCO](#) tapes enhanced by columnar defects along a part of the tape thickness

By Gerbaldo, R.; Ghigo, G.; Gozzelino, L.; Mezzetti, E.; Minetti, B.; Caracino, P.; Gherardi, L.
From [Institute of Physics Conference Series \(1997\), 158\(Applied Superconductivity 1997, Vol. 2\), 1101-1104](#).
Language: English, Database: CAPLUS

This paper analyses the implantation of columnar defects on a surface layer of Ag/[BSCCO-2223](#) tapes. Columnar-defect length was ~ 5% of the whole specimen. Large shift of the IL was detected. The IL shape shows features characteristic of strong vortex localization in high temp. regimes. 3D-2D cross-over field shifts towards higher fields. Furthermore, the expt. detects a significant enhancement of the J_c and the hardness to the dropping off of the performance in field. IL and J_c anisotropy of the irradiated samples is reduced.

~5 Citings

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200. Electrical characteristics of [BSCCO-2223](#) kA class conductors in the temperature range 77-110 K

By Ashworth, S. P.; Chudzik, M. P.; Glowacki, B. A.; Lanagan, M. T.
From [Institute of Physics Conference Series \(1997\), 158\(Applied Superconductivity 1997, Vol. 2\), 949-952](#). Language: English, Database: CAPLUS

Monoliths capable of carrying very high currents (up to 1 kA at liq. N temps.) were produced by cold pressing [BSCCO-2223](#) powders. These conductors have rectangular cross sections of order 1 cm², are up to 10 cm long and have low resistance current injection contacts. Data are presented on the transport crit. current and V-I characteristics of these conductors as a function of temp. in liq. N between 77 and 110 K and as a function of magnetic field to 0.8 T. These measurements utilize transport currents approaching 1 kA and consequently require liq. cooling at all temps., and this is achieved using a pressurized liq. N cryostat. The crit. current dependence on temp. and V-I characteristics are very different to those of, for example, [BSCCO-2223](#) OPIT tapes. The effect of the prodn. processes of these two conductor forms and the subsequent microstructure are discussed and related to the different elec. characteristics.

~2 Citings

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201. Scaling and anisotropy of critical currents in [BSCCO-2223](#) tapes with high filling factor

By Hortig, Michael; Gabrielsen, Bent; Lehndorff, Beate; Lucke, Bernhard; Piel, Helmut; Theisejans, Rainer; Wilberg, Rainer
Edited By: Nakajima, Sadao; Murakami, Masato
From [Advances in Superconductivity IX, Proceedings of the International Symposium on Superconductivity, 9th, Sapporo, Oct. 21-24, 1996 \(1997\), 2, 839-842](#). Language: English, Database: CAPLUS

To understand to understand the high anisotropy of the crit. c.d. of Ag sheathed [BSCCO-2223](#) tapes prep'd. by the std. powder-in-tube process transport expts. were performed. A new technique gave multifilamentary tapes with filling factors >50%. For the crit. c.d. j_c values of 30 kA/cm² were obtained at 77 K in self field. The current-voltage characteristics of the tapes were measured with the tape plane oriented parallel and perpendicular to the applied field. The anisotropy of the crit. current is compared with the transition temp. T_g vs. B computed from the scaling of the V-I characteristics.

~0 Citings

202. High ramp rate excitation characteristics of a BSCCO-2223 silver sheathed tape coil coupled to a cryocooler

By Ohkura, Kengo; Ueyama, Munetugu; Hayashi, Kazuhiko; Sato, Ken-Ichi

Edited By: Nakajima, Sadao; Murakami, Masato

From [Advances in Superconductivity IX, Proceedings of the International Symposium on Superconductivity, 9th, Sapporo, Oct. 21-24, 1996 \(1997\)](#), 2, 957-960. Language: English, Database: CAPLUS

We report a new BSCCO 3-T magnetic system coupled to a cryocooler having a room temp. 40 mm bore and high ramp rate magnetic excitation characteristics with the condition from 1 T/min to 24 T/min and the cyclic operation test at the ramp rate of 2 T/min. No quenching and degradation occurred and the coil system could be very stably operated.

~2 Citings

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203. Magnetic flux penetration and creep in BSCCO-2223 composite ceramics

By Vanderbemden, Ph; Destombes, Ch; Cloots, R.; Ausloos, M.

From [Superconductor Science & Technology \(1998\)](#), 11(1), 94-100. Language: English, Database: CAPLUS, DOI:10.1088/0953-2048/11/1/019

The authors have experimentally investigated the magnetic flux penetration through a Bi-2223 polycryst. superconductor synthesized by a classical solid-state reaction method. Elec. resistance, AC susceptibility, the Campbell method, and magnetic flux waveform recordings have been analyzed and compared in order to separate clearly intergrain and intragrain contributions. The AC susceptibility frequency dependence has been also examined at T=77 K in a broad field range (0.01 G < B_{AC} < 100 G). The activation energy as a function of AC applied magnetic field is found to present a pronounced minimum for an induction (8 G) corresponding to full magnetic flux penetration through the intergranular matrix.

~15 Citings

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204. Progress of and prospects for bismuth- and thallium-based HTS conductors

By Motowidlo, L. R.; Selvamanickam, V.; Sokolowski, R. S.

Edited By: Nakajima, Sadao; Murakami, Masato

From [Advances in Superconductivity IX, Proceedings of the International Symposium on Superconductivity, 9th, Sapporo, Oct. 21-24, 1996 \(1997\)](#), 2, 825-830. Language: English, Database: CAPLUS

Intermagetics has developed BSCCO-2212, BSCCO-2223, and TI-1223 wires and tapes as multi-filamentary and surface-coated conductors and has applied these to the construction of specialty magnets, power cables, generator coils, and transformers. An overview of recent progress made in improving the performance of these materials is presented, and the prospects for commercialization are discussed in light of their price/performance characteristics as compared with commercially available low-temp. superconductors. A review, with 14 refs.

~1 Citing

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205. A.C. losses in Bi-2223 tapes for power applications

By Gherardi, Laura; Gomory, Fedor; Mele, Renata; Coletta, Giacomo

From [Superconductor Science & Technology \(1997\)](#), 10(12), 909-913. Language: English, Database: CAPLUS, DOI:10.1088/0953-2048/10/12/010

Improved measuring procedures and interpretation efforts showed that the critical state model is fully applicable for describing the behavior of HTS tapes for power applications. By this means, the authors could consistently analyze magnetic and transport measurements and study possible inhomogeneities and geometrical peculiarities in BSCCO-2223 tapes. Examples of such an analysis are given in this contribution. Losses in multistrand conductors require a more complex model and further development of the experimental procedures; the results of a.c. transport measurements on a 13 m long, multilayer, prototype conductor sample are also discussed here.

~14 Citings

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206. Influence of partial oxygen pressure on the processing of Ag-sheathed BSCCO-2223 tapes

By Penny, M.; Feltham, S.; Beduz, C.; Yang, Y.; Scurlock, R.; Wroe, R.
From *Cryogenics* (1997), 37(10), 601-604. Language: English, Database: CAPLUS, DOI:10.1016/S0011-2275(97)00060-X

The effect of sintering in various oxygen atmospheres on transport J_c has been investigated. The results of the peak J_c with total sintering time are presented for each partial oxygen pressure ($P_{O_2} = 0.04, 0.075, 0.21$). Two important processing parameters of tapes were adjusted to ensure a fair comparison of each P_{O_2} . Firstly, as the melting temp. of BSCCO decreases with decreasing P_{O_2} , it was necessary to alter the sintering temps. to maintain the same subcooling for each P_{O_2} . Secondly, the first and second intermediate rollings of the tapes were performed when there were equal ams. of 2223 phase. The peaks in J_c against total sintering time occurred at 200 h for $P_{O_2} = 0.21$, 45 h for $P_{O_2} = 0.075$, and 90 h for $P_{O_2} = 0.04$. This relates to the stability range and the incubation time of BSCCO-2223 in P_{O_2} and could be an important tool to reduce the long processing time of optimized tapes.

~3 Citings

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207. Losses in ac of BSCCO-2223 superconducting monofilament and multifilament tapes at power frequencies

By Mench, S.; Lelovic, M.; Dies, T.; Eror, N. G.; Blaachandran, U.; Haldar, P.
From *Journal of Materials Research* (1997), 12(11), 3085-3089. Language: English, Database: CAPLUS, DOI:10.1557/JMR.1997.0401

The ac magnetic losses at power frequencies (60 Hz) were investigated for mono- and multifilament Ag-sheathed (Bi, Pb)₂Sr₂Ca₂Cu₃O_y (BSCCO-2223) tapes with similar I_c values at 77 K. The multifilament sample exhibited higher losses than the monofilament under the same conditions. Loss peaks are discussed in terms of intergranular, intragranular, and eddy current losses. Because of BSCCO's anisotropy, field orientation has a large effect on the magnitude of these peaks, even at relatively small angles. Losses for fields applied parallel to the c-axis of the textured BSCCO grains are larger by over an order of magnitude than those applied perpendicular.

~0 Citings

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208. Connectivity and flux pinning improvements in Ag-clad BSCCO-2223 tapes produced by changes in the cooling rate

By Parrell, J. A.; Larbalestier, D. C.; Riley, G. N., Jr.; Li, Q.; Carter, W. L.; Parrella, R. D.; Teplitsky, M.
From *Journal of Materials Research* (1997), 12(11), 2997-3008. Language: English, Database: CAPLUS, DOI:10.1557/JMR.1997.0394

The rate at which Ag-clad (Bi, Pb)₂Sr₂Ca₂Cu₃O_x tapes are cooled from their final reaction heat treatment influences both the intergranular connectivity and intragranular flux pinning strength of the polycryst. filaments. As the cooling rate for 825°C to 730°C in 7.5% O₂ was decreased over a range of 5°C/min to 0.005°C/min J_c (77 K, 0 T) increased from ~8 to ~24 kA/cm², and the irreversibility field increased from ~120 to ~200 mT. The J_c (4.2 K, 0 T) increased in a similar fashion. Cooling slowly also sharpened the crit. temp. transition and increased the crit. onset temp. from 107 K to 109 K. The improvements in the superconducting properties occurred despite partial decompn. of the (Bi, Pb)₂Sr₂Ca₂Cu₃O_x phase into non-superconducting impurity phases during the slow cooling. A microstructural basis for these multiple effects is described.

~17 Citings

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209. BSCCO-2223 Ag-sheathed tapes production

By Baldini, A.; Bargioni, L.; Conti, S.; Garre, R.
From *Nuovo Cimento della Societa Italiana di Fisica, D: Condensed Matter, Atomic, Molecular and Chemical Physics, Fluids, Plasmas, Biophysics* (1997), 19D(8-9), 1451-1456. Language: English, Database: CAPLUS, DOI:10.1007/BF03185446

A review with 8 refs. The activity of the Superconductors Division of Europa Metalli S.P.A. in the field of HTS is mainly devoted to the prodn. of long unit lengths of **BSCCO-2223** Ag-sheathed tapes which were used for the realization of small pancake magnets and were obtained by the OPIT technique and subsequent drawing and rolling plastic deformation procedures. Several mono- and multi-filamentary layouts were studied to optimize the elec. properties and minimize degrdns. due to winding. At present the best results were obtained with a multi-filamentary geometry, which shows higher crit. currents and lower degrdns. with respect to the mono-filamentary geometry and consequently proves more suitable for the prodn. of small pancake magnets. Once heat treated, a std. characterization is carried out on short samples, consisting in elec. crit. current measurements at 77 K in zero field and at 4.2 K in an external magnetic field up to 12 T to study the transport properties, and in a.c. susceptibility measurements at 77 K to det. the effectiveness of the thermal heat treatment on the formation of the **BSCCO-2223** phase.

~0 Citings

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210. Magnetic characterization of multifilamentary **BSCCO (2223)**-Ag tapes

By Cimberle, M. R.; Ferdeghini, C.; Flukiger, R.; Giannini, E.; Grasso, G.; Marre, D.; Pallecchi, I.; Putti, M.; Siri, A. S. From *Nuovo Cimento della Societa Italiana di Fisica, D: Condensed Matter, Atomic, Molecular and Chemical Physics, Fluids, Plasmas, Biophysics* (1997), 19D(8-9), 1259-1265. Language: English, Database: CAPLUS, DOI:10.1007/BF03185418

Twisted and not twisted multifilamentary **BSCCO (2223)**-Ag tapes, prepd. by the PIT technique, were characterized by SQUID magnetometry with the magnetic field applied both parallel and perpendicular to the c-axis. From these measurements an estn. of the crit. current densities J_{ab} with Hext parallel to the c-axis, J_{ab} with Hext parallel to the a-b planes and J_c was obtained. These values are in fairly good agreement with those obtained by transport measurements. The tapes turned out to be very homogeneous and practically no difference was found in the hysteresis loops of twisted and not twisted tapes, which suggests that the mean grain alignment is the same in the two types of samples and the current path probably follows the brick wall model.

~1 Citing

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211. J_c enhancement by partial melting in **BSCCO 2223** ceramics

By Marchetta, M.; Dimesso, L.; Migliori, A.; Masini, R.; Calestani, G. From *Nuovo Cimento della Societa Italiana di Fisica, D: Condensed Matter, Atomic, Molecular and Chemical Physics, Fluids, Plasmas, Biophysics* (1997), 19D(8-9), 1123-1129. Language: English, Database: CAPLUS, DOI:10.1007/BF03185400

The application of partial melting techniques to the densification of **BSCCO 2223** ceramics is presented. A new method has been developed, that avoids the peritectic decompn. of the **2223** phase and exploits the existence of a limited region of the phase diagram, occurring for compn. richer in Ca and Cu, in which this phase is the only **BSCCO** phase coexisting with the liq. This allows the densification process assisted by the liq. phase, limiting at the same time the formation of undesired intergrowths of lower T_c phases. In comparison with the usually adopted processes, the new method results in a dramatic decrease of the post-treatment times, which are typically limited to a few hours. By optimizing the thermal as well as the temporal parameters governing a std. two-steps procedure, values of J_c of the order of 10^3 Acm^{-2} , at 77 K, can be obtained for a global process time not exceeding 6 h.

~3 Citings

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212. Current transfer lengths and the origin of linear components in the voltage-current curves of Ag-sheathed **BSCCO** components

By Polak, M.; Zhang, W.; Parrell, J.; Cai, X. Y.; Polyanskii, A.; Hellstrom, E. E.; Larbalestier, D. C.; Majoros, M. From *Superconductor Science & Technology* (1997), 10(10), 769-777. Language: English, Database: CAPLUS, DOI:10.1088/0953-2048/10/10/007

The commonly obsd. linear sections in the voltage-current characteristics of Ag-sheathed **BSCCO-2212** and **BSCCO-2223** composites were studied. One source of such characteristics is due to ohmic losses in the silver at the current feed points. Characteristic current transfer lengths are of the order of millimeters at 4.2 K and tenths of millimeters at 77 K. However, linear components can also be obsd. well away from current feed points. These were found to be assocd. with regions of locally reduced crit. current, which provoke local transfer of the excess current into the Ag, thus producing local, ohmic V-I characteristics. Because of the finite current transfer length, some ohmic voltage can be detected even outside regions of reduced crit. current. When the silver was removed from lower crit. current regions, ohmic voltages were no longer obsd., even when the crit. current was severely reduced by local damage with a laser. Within the range of elec. field covered by this expt. ($0.05\text{--}100\text{ }\mu\text{V cm}^{-1}$), we conclude that all ohmic voltages are produced by current flow in Ag.

~42 Citings

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213. Preparation and NMR study of fluorinated Pb-BSCCO-2223

By Frenkel Ben-Yakar, L.; Shames, A.; Bandyopadhyay, B.; Goren, S. D.; Korn, C.; Shaked, H.; Selig, H.; Ben-Dor, L.; Greenberg, J. H.

From *Physica C: Superconductivity (Amsterdam)* (1997), 282-287(Pt. 3), 1339-1340. Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(97)00743-0

Samples of $(\text{Bi,Pb})_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{10+\delta}$ (**BSCCO-2223**) prepd. by the sol-gel route were fluorinated in ClF_3 , resulting in ~3 F atoms per formula as measured by fluoride selective-electrode. The samples were characterized by x-ray diffraction (XRD) and magnetization measurements. Neither the lattice parameters nor T_c (114 K) changed after the fluorination. NMR measurements of ^{19}F at 20-400 K show that for $T > 270\text{ K}$ there are 2 types of F nuclei environments. At $<270\text{ K}$ only one line is resolved. At $T < T_c$, the F linewidth increases with decreasing temp. This is attributed to the formation of vortices. At very low temps., a new structure appears. This is attributed to an enhanced NQR signal from the Cu nuclei.

~1 Citing

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214. Progress in BSCCO-2223 tape technology

By Malozemoff, A. P.; Li, Q.; Fleshler, S.

From *Physica C: Superconductivity (Amsterdam)* (1997), 282-287(Pt. 1), 424-427. Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(97)00296-7

ASC multifilamentary composite tape based on **BSCCO-2223** high temp. superconductor (HTS) and a scalable rolling process has reached a record superconductor crit. c.d. J_c (77 K, 0 T) of up to 58000 A/cm^2 , and engineering (full cross-section including metal sheath) J_e (77 K, 0T) up to 15000 A/cm^2 . Pilot manufg. of long lengths (100-400 m) has permitted a variety of increasingly significant prototypes, including a 200 hp ac synchronous motor, a 3300 A (77 K) 50 m machine-stranded cable conductor, a 5 kJ SMES system, and an operational ion-beam switching magnet installed in a tandem accelerator for carbon mass spectrometry dating. Recent ASC progress in manufg. with J_e over 8000 A/cm^2 creates new opportunities for yet more advanced prototypes and com. development. 15 Refs.

~7 Citings

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215. Evaluation of a strengthening and insulation system for high temperature BSCCO-2223 superconducting tape

By King, C.; Herd, K.; Laskaris, T.; Mantone, A.

From *Advances in Cryogenic Engineering* (1997), 42B, 855-861. Language: English, Database: CAPLUS

A paper insulation process developed at the General Elec. Company (GE) for low temp. superconducting Nb_3Sn tape was modified to provide the same insulation system to high temp. (HTS) superconducting tapes, such as **BSCCO-2223**. The authors report on the insulation process and its effect on the tape performance. Several long lengths of conductor were tested, unwound, insulated and retested to examine any degrdn. issues. Addnl., HTS materials are inherently weak in relation to the winding and handling stresses in a manufg. environment. A system to provide mech. stabilization to Nb_3Sn tape through a lamination process was successfully applied to high temp. superconductors as a method to build a strong, windable composite. The system is described and mech. and elec. properties of the strengthened tapes are discussed.

~2 Citings

216. AC loss measurements on multifilamentary BSCCO 2223 high-temperature superconductors

By Aized, D.; Jones, E. C.; Snitchler, G.; Campbell, J.; Malozemoff, A. P.; Schwall, R. E.

From *Advances in Cryogenic Engineering* (1997), 42B, 581-586. Language: English, Database: CAPLUS

A calorimetric method for measuring a.c. loss in long lengths of high temp. superconductor (HTS) at 77 K was developed. Complementary systems with resolu. down to 1 mW/cc were installed at Oak Ridge National Lab. (ORNL) and American Superconductor Corporation (ASC) and give consistent results, confirming the reliability of the technique. AC excitation fields up to 0.25 T and at 5 to 60 Hz are supplied by a multifilament BSCCO solenoid which was in operation for over a year; this is the world's 1st HTS magnet system that performs a useful tech. function in a cost-competitive manner. Results are presented on 85 filament BSCCO composite conductors showing dependence suggesting hysteretic losses.

~0 Citings

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217. Heating-induced acoustic emission in an adiabatic high-temperature superconducting winding

By Arai, Kazuaki; Iwasa, Yukikazu

From *Cryogenics* (1997), 37(8), 473-475. Language: English, Database: CAPLUS, DOI:10.1016/S0011-2275(97)00072-6

Heating-induced acoustic emission (AE) signals have been detected in an adiabatic BSCCO-2223 tape winding. A heating-induced differential temp. within the winding of ~ 10 K generated AE signals that were sufficient for detection. The results demonstrate, as in low-temp. superconducting magnets, that AE is useful for detection of a local temp. rise in high-temp. superconducting magnets.

~3 Citings

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218. New technology to improve texturing and transport current in bulk (2223) BSCCO superconductors

By Tampieri, A.; Celotti, G.; Calestani, G.; Lesca, S.

From *Key Engineering Materials* (1997), 132-136(Pt. 2, Euro Ceramics V), 1247-1250. Language: English, Database: CAPLUS, DOI:10.4028/www.scientific.net/KEM.132-136.1247

Bulk BSCCO (2223) was prep'd. by a multi-step process (high cold pressing + pressureless sintering + hot-forging (HF)) to increase the extent of grain orientation. The final d. of the samples exceeds 95% and the orientation factor increases up to ~80%. Powders were prep'd. with different techniques starting by several nominal compns. The introduction of a short high-temp. treatment during HF, acts as a purifying process, promoting in addn. the extrusion of secondary phases and leaving in the sample only the (2223) as a superconducting phase and islands of Ca-Sr-Cu-O and CuO. In the case of the powder nearest to the stoichiometric compn., an annealing at 400° in O was found essential to recover the O content, lost during densification and texturing treatments, and to increase T_{c0} . Samples prep'd. with powder having Ca and Cu excess do not contain the (2212) phase even after hot-forging. As a consequence, J_{ct} value of the textured samples, at 77 K, reaches ~10,000 A/cm², i.e., 2 order of magnitude higher in respect to the simple PLS sample. The use of sol-gel powder improves the texturing of the final samples, while J_c values were less improved than expected, due to the huge growth of secondary phases ppts.

~3 Citings

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219. Annealing in preparation of BSCCO-2223 superconductors

By Otto, Alexander; Riley, Gilbert N., Jr.; Carter, William L.

From *U.S.* (1997), US 5661114 A 19970826, Language: English, Database: CAPLUS

A method for prepg. a BSCCO-2223 superconducting article includes annealing an article comprised of BSCCO-2223 at ~500-787° in an atm. having an O pressure selected from within the region having a lower bound defined by the equation $P_{O_2} \text{ (lower)} \geq 3.5 \times 10^{10} \exp(-32,000/T + 273)$ and an upper bound defined by the equation $P_{O_2} \text{ (upper)} \leq 1.1 \times 10^{12} \exp(-32,000/T + 273)$. The article is annealed for a time sufficient to provide at least a 10% increase in crit. c.d. as compared to the crit. c.d. of the pre-anneal oxide superconductor article. The oxide superconductor $\text{Bi}_{2-y}\text{Pb}_y\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{10+x}$, where $0 \leq x \leq 1.5$ and $0 \leq y \leq 0.6$, is obtained, having a crit. transition temp. of >111.0 K, as detd. by the 4-point probe method.

~7 Citings

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220. Non-destructive measurement of current distribution in high-temperature superconductors (HTS conductors)

By Johnston, M. D.; Everett, J.; Dhalle, M.; Caplin, A. D.; Moore, J. C.; Fox, S.; Grovenor, C. R. M.; Grasso, G.; Hensel, B.; Flukiger, R.

Edited By: Balachandran, U.; McGinn, P. J.; Abell, J. S

From [High Temperature Superconductors: Synthesis, Processing, and Large-Scale Applications, Proceedings of a Symposium held during the TMS Annual Meeting, Anaheim, Calif., Feb. 4-8, 1996 \(1996\)](#), 213-222. Language: English, Database: CAPLUS

We describe scanning Hall probe studies of the current distribution in **BSCCO 2223**, 2212 and TSCCO 1223 conductors, by measurement of the self-field and remanent flux profiles. The pattern of current flow is dependent on the total current amplitude as well as the underlying microstructural features. We correlate these local studies with macroscopic information from transport and magnetization expts., and make comparison between the three materials systems. **BSCCO 2223** is found to be dominated by the microstructural inhomogeneities whereas the properties of **BSCCO 2212** and TSCCO 1223 are governed by the intrinsic electrodynamics.

~3 Citings

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221. Quantitative analysis of the effects of strain-state on the microstructure and J_c of **BSCCO tapes**

By Blumenthal, W. R.; Zhu, Y. T.; Sebring, R. J.; Lowe, T. C.; Asaro, R. J.

Edited By: Balachandran, U.; McGinn, P. J.; Abell, J. S

From [High Temperature Superconductors: Synthesis, Processing, and Large-Scale Applications, Proceedings of a Symposium held during the TMS Annual Meeting, Anaheim, Calif., Feb. 4-8, 1996 \(1996\)](#), 71-80. Language: English, Database: CAPLUS

New approaches are needed to improve the J_c of superconducting tape produced by co-deforming a ductile silver sheath contg. the superconducting oxide using the power-in-tube process. This study investigates improvements in J_c generated by modifying the strain-state during rolling of silver-sheathed $\text{Bi}_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{10+x}$ (**BSCCO-2223**) tape using quant. image anal. of the different phases. Pure compression and combined compression-shear loading was achieved by embedding **BSCCO-2223** tapes at different locations within thick steel blocks. High hydrostatic compressive stress was imposed by confining the tape width. Tapes deformed with combined shear-compression exhibited measurably higher J_c values than tapes subjected to pure compression, but their microstructures showed little difference in the amt. of non-conducting (including porosity) phase content. However, constraining the tape width resulted in the most significant increase in J_c which corresponded to a much lower porosity and non-conducting phase vol. in the oxide near the tape edge.

~0 Citings

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222. Current-voltage characteristics of **BSCCO conductors**

By Everett, J.; Dhalle, M.; Cuthbert, M. N.; Johnston, M. D.; Caplin, A. D.

Edited By: Matsushita, Teruo; Yamafuji, Kaoru

From [Critical Currents in Superconductors, Proceedings of the International Workshop, 8th, Kitakyushu, Japan, May 27-29, 1996 \(1996\)](#), 463-466. Language: English, Database: CAPLUS

Transport and magnetization measurements of current-voltage (I-V) characteristics of conductors complement each other in two important respects: The magnetic studies extend the characteristics downward several orders magnitude in elec. field E , and the topol. of the important current paths may be very different in the two cases. Also, current paths that are assocd. with grain boundary weak-links (WL) are suppressed in rather low magnetic fields. The authors report detailed transport and magnetic studies of two Ag-sheathed **BSCCO-2223** tape conductors (**BSCCO/Ag**), and interpret the data within a description that incorporates a spectrum of current paths, and includes both inter- and intra-granular current limitation.

~0 Citings

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223. Universal behavior in scaling property of current-voltage characteristics of polycrystalline high-T_c superconductors

By Ishii, Hideo; Shingo, Seiji; Harada, Sin-Ichiro; Hara, Tsukushi

Edited By: Matsushita, Teruo; Yamafuji, Kaoru

From [Critical Currents in Superconductors, Proceedings of the International Workshop, 8th, Kitakyushu, Japan, May 27-29, 1996](#) (1996), 157-160. Language: English, Database: CAPLUS

In this study, current-voltage(I-V) characteristics of ceramic YBCO and **BSCCO-2223** was investigated under external magnetic field by the conventional four terminal method. For both samples, I-V curves were scaled onto two universal curves as predicted by the vortex glass-liq. phase transition. The scaling exponents (ν , z) assocd. with the scaling collapse were common, (1.0~1.4, 2.4~3.0), for the two materials. Although these values are at variance with those reported for a YBCO epitaxial thin film by Koch et al. and following works as well as our recent report on YBCO polycrystal films, they are consistent with other reports that dealt with ceramic polycrystal samples such as YBCO and **Tl-2223**. This result seems to indicate that the phenomena related to the appearance of the scaling behavior may be common among randomly oriented polycrystal materials and different in some way from those involved in films.

~1 Citing

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224. Elastic and relaxation properties of HTSC composites **BSCCO(2223)** + (0-100)% Ag in the temperature range 5-300 K

By Pal-Val, P. P.; Pal-Val, L. N.; Natsik, V. D.; Kislyak, I. F.; Dotsenko, V. I.

From [Fizika Nizkikh Temperatur \(Kiev\)](#) (1996), 22(12), 1452-1458. Language: Russian, Database: CAPLUS

Acoustic and superconducting properties of ceramic composites $\text{Bi}_{1.6}\text{Pb}_{0.4}\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{10+\delta}\text{-Ag}$ have been studied in a wide range of Ag concns. (0-100%). In the vicinity of 150 K, an absorption peak is found in the temp. spectrum of ultrasound absorption for pure **BSCCO(2223)** ceramic samples. The peak height changes nonmonotonically when Ag is added to the ceramic. The relaxation nature of the peak is established and the activation parameters of the related relaxation process localized on the grain boundaries of the ceramics are detd. Another relaxation absorption peak at ~70 K is obsd. in the **BSCCO(2223)**-Ag samples, the intensity of which increases with increasing Ag concn. The correlation revealed between the anomalies in the concn. dependences of the acoustic properties and the width of the superconducting transition shows that the addn. of Ag to intergranular spaces is to a great extent responsible for the elastic, relaxational, and superconducting properties of the composites studied.

~1 Citing

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225. Processing of **BSCCO 2212** and **2223** superconductor compounds

By Lim, H. J.; Byrne, J. G.; Chae, M. S.; Maple, M. B.

From [Materials and Manufacturing Processes](#) (1997), 12(2), 261-274. Language: English, Database: CAPLUS, DOI:10.1080/10426919708935140

High-T_c **BSCCO** superconductor tapes were prepd. by the conventional powder-in-tube method. Some tapes involved partial melting, while the others involved solid-state processing only. Bulk samples were prepd. by powder metallurgy. X-ray diffraction showed the presence of both **BSCCO 2223** (T_c = 105 K) and **BSCCO 2212** (T_c = 80 K) phases in all the materials. For the mostly **BSCCO 2212** phase samples, x-ray studies indicated that tape #1 which involved partial melting at 850°C for 0.3 h had a higher degree of basal orientation than either a tape #2 sample which involved partial melting at 855°C for 0.5 h, or a bulk (#2) sample. For the mostly **BSCCO 2223** phase samples, however, a comparison of bulk (#1), tape #3 (solid state processing at 840°C) and tape #4 (partial melting at 865°C for 0.5 h) samples, showed that the solid-state processed tape (#3) had the highest degree of basal orientation. D.c. magnetic susceptibility measurements were used to follow the transition at T_c. Crit. c.d., J_c, values were estd. from DC magnetic hysteresis loops for all bulk and tape samples.

~1 Citing

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226. Percolation and preferential current flow in high-T_c superconducting Ag-sheathed Bi-Sr-Ca-Cu-O composites

By Pashitski, A.E.; Polyanskii, A.A.; Gurevich, A.; Parrell, J.; Larbalestier, D. C.

From [Program and Extended Abstracts - International Workshop on Superconductivity, "Controlled Processing of High-Temperature Superconductors: Fundamentals and Applications"](#), Kihei, Hawaii, June 18-21, 1995 (1995), 365-366.

Language: English, Database: CAPLUS

Transport current (I) flow in **2223-BSCCO**/Ag composite at $T=10-77$ K and $H_a=0-400$ Oe has been imaged by using the magneto-optical (MO) technique. For $I=0$ the magnetization currents display a pronounced macroscopic granularity on a scale larger than the actual grain size. By applying $I \approx 0.8 I_c$, this granular behavior was largely replaced by a more uniform current flow, indicating that the barriers to magnetization currents in **2223-BSCCO** tape are not strong ones and can be overcome by applying higher elec. fields typical for transport measurements.

~0 Citings

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227. Thickness dependent J_c versus field behavior in **2223-BSCCO** tapes at 77 K

By Laura, Gherardi; Paola, Caracino; Sergio, Spreafico; Giacomo, Coletta

From [Program and Extended Abstracts - International Workshop on Superconductivity, "Controlled Processing of High-Temperature Superconductors: Fundamentals and Applications"](#), Kihei, Hawaii, June 18-21, 1995 (1995), 363-364.

Language: English, Database: CAPLUS

The dependence of J_c upon applied field in High T_c superconducting wires and tapes is known to exhibit some typical and intriguing features. We have investigated the field dependence of J_c at liq. nitrogen temp. in **2223-BSCCO** tapes fabricated by Powder In Tube, by analyzing in particular detail the hysteresis of J_c for increasing and decreasing magnetic fields up to 1 T, with parallel or perpendicular orientation with respect to the tape face. Several tapes with different thickness, having the same crit. current (or the same crit. c.d.) were measured and compared. The field at which J_c begins to drop, the amplitude of the hysteresis cycle, the field at which the curves for field "up" and "down" cross, and the decrease of J_c in zero applied field after one cycle, compared to the "virgin" $J_{c,B=0}$, were all found to significantly correlate with the thickness of the superconducting core. Thorough discussion of these effects, taking into account also the morphol. and microstructural characteristics of these tapes, is provided.

~0 Citings

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228. Current limiting mechanisms in high temperature superconductors

By Larbalestier, D.C.; Babcock, S.E.; Cai, X.Y.; Dorris, S.E.; Edelman, H.S.; Gurevich, A.; Parrell, J.A.; Pashitski, A.; Polyanskii, A.; et al.

From [Program and Extended Abstracts - International Workshop on Superconductivity, "Controlled Processing of High-Temperature Superconductors: Fundamentals and Applications"](#), Kihei, Hawaii, June 18-21, 1995 (1995), 17-20.

Language: English, Database: CAPLUS

Three recent expts. addressing the current limiting mechanisms of polycryst. **BSCCO** compds. are summarized. In the 1st the irreversibility field (H^*) of a **BSCCO-2223** tape is a monotonically increasing function through 3 heat treatments and 2 deformation cycles. It was argued that H^* is detd. by the intragrain flux pinning properties. However, little is known about flux pinning in unirradiated **BSCCO-2223** and it is surprising that intragrain flux pinning would create a continuous increase of H^* . Similar measurements made on a strongly coupled 8° [001] tilt boundary in a **BSCCO-2212** bicrystal suggest that the grain boundary is the source of the continuous function. The grain boundary has qual. identical characteristics to the grain but H^* and the intergrain J_c are both slightly depressed in comparison to the intragrain properties. Thus a primary limit to current flow is set by flux pinning and intergranular coupling, the scale length of both being of order nanometers. The 3rd expt. uses magneto-optical imaging to provide a spatially resolved picture of the flux penetration into **BSCCO** tapes on a scale of order $3 \mu\text{m}$. The penetration has 2 characteristic scales, 1 being of order of the tape thickness ($\sim 50 \mu\text{m}$) and 1 of order mm. Neither scale is characteristic of the grain length which is of order $5 \mu\text{m}$. The authors infer that cracks and other weakly bonded interfaces are the more macroscopic defects which control long range current flow. Thus crit. current limiting mechanisms exist on scales ranging from nanometers to millimeters. Simultaneous optimization of the macrostructure and nanostructure is inherently complex, which emphasizes that the major problem of HTS conductor development is to acquire a better understanding of the materials science of polycryst. assemblages of these complex compds.

~2 Citings

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229. Positron annihilation study of the high- T_c $(\text{Bi,Pb})_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_x$ superconductor

By Lim, H. J.; Byrne, J. G.

From [Physica B: Condensed Matter \(Amsterdam\)](#) (1997), 229(3&4), 294-300. Language: English, Database: CAPLUS, DOI:10.1016/S0921-4526(96)00524-8

Positron lifetime spectroscopy (PLS) and positron Doppler-broadening spectroscopy (PDBS) were applied to the high- T_c lead-doped $\text{Bi}_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_x$ (BPSCCO 2223) superconductor as a function of temp. Neither positron lifetimes nor Doppler parameters (S , W , and S/W) showed significant change through T_c . This may result from having the highest positron d . in the open BiO_2 double layers and no significant positron d . in the superconducting CuO_2 layers where positrons, if mainly present, are known to be sensitive to the transition in other high- T_c superconductors. Doppler parameters showed that the probability of positron annihilations with core electrons in the lattice slightly increased and that the probability of positron annihilations with conduction electrons slightly decreased as the temp. decreased from ambient temp. to 20 K. The lifetime assocd. with positron annihilations in the perfect lattice of the sample (τ_1) was 209 ps and, due to the annihilations at internal surfaces or voids in the sample (τ_2) was about 540 ps, independent of temp. Finally, the mean lifetime for BSCCO 2223 was about 307 ps.

~15 Citings

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230. A structural transformation and its effect on the physical properties of the V-substituted $\text{Bi}_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{10+y}$ system

By Yakinci, M. E.

From [Journal of Physics: Condensed Matter](#) (1997), 9(5), 1105-1121. Language: English, Database: CAPLUS, DOI:10.1088/0953-8984/9/5/015

Systematic substitution of V in the $\text{Bi}_{2-\delta}\text{V}_\delta\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{10+y}$ system ($\delta = 0, 0.2, 0.4, 0.6, 0.8$ and 1) was carried out in order to det. the effect of V ions on the phase formation and on the phys. properties of the BSCCO 2223 system. The most interesting observation was structural transformation of the system from tetragonal to orthorhombic after $\delta = 0.6$. A solid soly. limit for V was also found to exist. Resistivity and susceptibility studies have shown that high- T_c supercond. exists up to $\delta = 0.6$ and that the semiconducting-to-metallic transition or fully semiconducting behavior occurs after this limit. A fractionally small but very-high- T_c transition at around 210 K was also obsd., but it was not reproducible. Among the V-substituted samples the best elec. properties were obtained for $\delta = 0.2$; T_c and T_0 were found to be 112 K and 92 K, resp., the calcd. value of J_c was found to be $1.11 \times 10^5 \text{ A cm}^2$ at 4.5 K and the thermal cond. parameter k was found to be $6.4 \text{ mW cm}^{-1} \text{ K}^{-1}$. By substituting the higher-valence state V^{5+} ions for Bi^{3+} , the thermal treatment time is significantly reduced. The magnetic properties, IR and thermal cond. results showed evidence of a strong coupling mechanism in the $\text{Bi}_{2-\delta}\text{V}_\delta\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{10+y}$ system.

~19 Citings

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231. Bulk applications of HTS wire

By Malozemoff, A. P.

Edited By: Batlogg, Bertram

From [Proceedings of the 10th Anniversary HTS Workshop on Physics, Materials and Applications](#), Houston, Mar. 12-16, 1996 (1996), 47-51. Language: English, Database: CAPLUS

A review, with 27 refs., reveals remarkable breakthroughs but also the linear progress of BSCCO-2223 rolled multifilament composite wire over time, attaining $44,000 \text{ A/cm}^2$ (77 K, 0 T) recently, with significant opportunities for the future.

~6 Citings

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232. Enhancement of critical current density and strain tolerance in Ag-sheathed BSCCO (2223) tapes by continuous silver reinforcement

By Vasanthamohan, N.; Singh, J. P.

From [Superconductor Science & Technology](#) (1997), 10(2), 113-118. Language: English, Database: CAPLUS, DOI:10.1088/0953-2048/10/2/008

We used a modified powder-in-tube technique in various configurations to demonstrate significant improvement in the transport properties and strain tolerance of Ag-sheathed **BSCCO** superconducting tapes. In this process, the **BSCCO** core has been reinforced with a Ag rod placed concentrically within the Ag tube and then processed into ~250- μ m-thick tapes by established metalworking techniques. A noticeable improvement in crit. c.d., J_c , was obsd. as a result of this modification. This increase is attributed to increased texturing, decrease in thickness of **BSCCO** layers, increase in the length of the Ag/**BSCCO** interface, and decrease in the vol. fraction of the superconducting core which is less effective in contributing toward the overall crit. current of the tape. Further improvements have been made to this configuration by incorporating another ring of superconductor into the core. The improved configurations led to a significant increase in J_c over that of monolithic **BSCCO** tapes. Crit. current densities of ~40 kA/cm² at 77 K and self-field have been consistently achieved in 150- μ m-thick tapes after 150 h of sintering. Anal. of crit. current through various sections of the tape indicates that 80% of the crit. current is carried by the center section of the core, within which the Ag rod is located. The bending strain tolerance of the tapes contg. a Ag core is significantly better than that of the monolithic tapes. At an applied surface bending strain of 1.0%, ~98% of the initial J_c was retained in Ag-reinforced tapes, compared with only 54% in monolithic tapes.

~14 Citings

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233. Simplified deformation-sintering process for oxide superconducting articles

By Li, Qi; Podtburg, Eric R.; Walsh, Patrick John; Carter, William L.; Riley, Gilbert N., Jr.; Rupich, Martin W.; Thompson, Elliott; Otto, Alexander

From [PCT Int. Appl. \(1996\), WO 9639366 A2 19961212](#), Language: English, Database: CAPLUS

A precursor article including a plurality of filaments comprising a precursor oxide having a dominant amt. of a tetragonal **BSCCO** 2212 phase and a constraining member surrounding each of the filaments is provided. Each of the filaments extends along the length of the article. The oxide article is heat treated at an O partial pressure and temp. selected to convert a tetragonal **BSCCO** 2212 oxide into an orthorhombic **BSCCO** 2212 oxide and, thereafter, roll worked in a high redn. draft of about 40-95% in thickness so that the filaments have a constraining dimension is equiv. to a longest dimension of the oxide superconductor grains. The rolled article is sintered to obtain a **BSCCO** 2223 oxide superconductor.

~4 Citings

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234. Measuring and reducing a.c. losses in **BSCCO** wires

By Malozemoff, A. P.

Edited By: Hayakawa, Hisao; Enomoto, Youichi

From [Advances in Superconductivity VIII, Proceedings of the International Symposium on Superconductivity, 8th, Hamamatsu, Japan, Oct. 30-Nov. 2, 1995 \(1996\), 2, 1263-1267](#). Language: English, Database: CAPLUS

Because many applications for high temp. superconducting (HTS) wire involve a.c. currents and fields, developing low-loss a.c. HTS wire is very important. A first step is being able to accurately measure the loss, and significant problems have been reported in early studies: discrepancies have emerged between magnetic and transport techniques, and the transport results have been found to depend on measurement details like the voltage tap loop configuration. A soln. to the transport measurement problem has emerged, with the loop extending away from the wire a distance of several wire widths. A calorimetric technique has also been developed which provides a cross-check for the reliability of other techniques. A second step is to develop special materials parameters to reduce the a.c. losses of composite multifilamentary **BSCCO-2223**. Recent work has led to increased resistivity in the metal sheath, twisted and fine multifilament configurations, as well as underlying improvement of crit. c.d. which is important in improving the figure of merit - power loss per amp-meter.

~0 Citings

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235. Experimental assessment of the current-limiting mechanisms in **BSCCO/Ag** high-temperature superconducting tapes

By Dhalles, M.; Cuthbert, M.; Johnston, M. D.; Everett, J.; Flukiger, R.; Dou, S. X.; Goldacker, W.; Beales, T.; Caplin, A. D.

From [Superconductor Science & Technology \(1997\), 10\(1\), 21-31](#). Language: English, Database: CAPLUS, DOI:10.1088/0953-2048/10/1/004

The current-voltage characteristics and the magnetic field dependence of the crit. current of a range of mono-core **BSCCO 2223** tapes are presented, illustrating the complementary use of transport and magnetization expts. in detg. and analyzing the current-limiting dissipation processes in these HTS conductors. Below a magnetic cross-over field H^* the samples resemble a Josephson-linked current network, with the dominant dissipation at the weakest grain boundaries. In this regime, increasing field leads to a gradual fragmentation of the network. The network homogeneity and connectivity can be inferred from screening current length-scale measurements and comparison of transport and magnetization measurements. Above the cross-over field H^* , flux motion within the surviving strongly linked backbone dominates the dissipation. The details of the dependences of the crit. current and flux creep rate on magnetic field can be used to examine the intragranular pinning potential in the tapes. Despite the wide range of transport crit.-current values of the samples examd., the intragranular pinning proves to be remarkably sample independent. While J_c at low fields may be increased by improved processing that yields better intergrain connectivity, the high-field J_c can be enhanced only by strengthening the pinning within the **BSCCO 2223** crystallites themselves.

~43 Citings

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236. Critical current anisotropy and vortex glass scaling in silver sheathed **BBSCCO-2212** wires and **BSCCO-2223** tapes

By Lehnendorff, Beate; Fischer, Bernhard; Hortig, Michael; Mueller, Jens; Piel, Helmut; Theisejans, Rainer

Edited By: Hayakawa, Hisao; Enomoto, Youichi

From *Advances in Superconductivity VIII, Proceedings of the International Symposium on Superconductivity, 8th, Hamamatsu, Japan, Oct. 30-Nov. 2, 1995 (1996)*, 2, 883-886. Language: English, Database: CAPLUS

Silver sheathed **BSCCO**-conductors prepd. by profile rolling achieved J_c values of 25 kA/cm² for **BSCCO-2223** tapes and 5 kA/cm² for **BSCCO-2212** wires. Current-voltage characteristics were measured at 4.2-100 K in magnetic fields ≤ 8 T. The anisotropy of J_c in different orientations of the magnetic field appears to be strongly temp. dependent for the **BSCCO-2223**. Below 40 K it is weak due to the more 3-dimensional behavior of this material. In addn. the current-voltage characteristics of the 2212-wires exhibit only limited vortex glass behavior.

~0 Citings

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237. Basic study of silver-sheathed **BSCCO-2223** superconducting coil for SMES

By Ohkura, Kengo; Ueyama, Munetugu; Sato, Ken-ichi; Ryouman, Akira; Imai, Yoshihiro; Kishida, Takuya

Edited By: Hayakawa, Hisao; Enomoto, Youichi

From *Advances in Superconductivity VIII, Proceedings of the International Symposium on Superconductivity, 8th, Hamamatsu, Japan, Oct. 30-Nov. 2, 1995 (1996)*, 2, 863-866. Language: English, Database: CAPLUS

Mech. and electromagnetic properties of the Ag-sheathed **BSCCO-2223** tape for SMES were examd. The tensile-stress dependent J_c at 77 K of the Ag-sheathed **BSCCO-2223** tape was measured. The data indicate the characteristic I_c redn. is noted at ~ 60 MPa stress. The a.c. loss of the coil, 50 mm winding o.d., ~ 50 mm height, was measured by a lock-in-amplifier. The Ag-sheathed **BSCCO** tape should be useful for SMES.

~0 Citings

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238. Thermal conductivity of a **BSCCO(2223)** c-oriented tape: a discussion on the origin of the peak

By Castellazzi, S.; Cimberle, M. R.; Ferdeghini, C.; Giannini, E.; Grasso, G.; Marre, D.; Putti, M.; Siri, A. S.

From *Physica C: Superconductivity (Amsterdam) (1997)*, 273(3&4), 314-322. Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(96)00639-9

Thermal cond. and elec. resistivity measurements were performed on a highly c-oriented $(\text{Bi,Pb})_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{10}$ tape at 20-220 K to study the origin of the thermal cond. max. below T_c . The models the authors use involve some fundamental parameters, such as the amplitude of the energy gap, the Debye temp., the mean dimension of the grains and the residual electron-impurity scattering rate. The best fit was obtained by the phonon + electron approach, but the phonon approach yields a more correct value for the energy gap. Finally, within the employed framework, the authors can exclude that only the electron peak by itself might account for the exptl. data.

~20 Citings

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239. Possible interpretation on the existence of an anomalous inversion of some ZFC and FC transport characteristics in YBCO and BSCCO ceramic superconductors

By Lopez, J.; Mune, P.; Garcia, S.; Altshuler, E.

From [Physica C: Superconductivity \(Amsterdam\)](#) (1996), 272(1&2), 13-20. Language: English, Database: CAPLUS, DOI:10.1016/S0921-4534(96)00586-2

The authors performed a comparative and systematic study of voltage vs. current and crit. current vs. applied magnetic field characteristics measured in zero field cooling (ZFC) and field cooling (FC) conditions, in YBCO and BSCCO 2223 ceramic superconductors. They found an anomalous inversion of ZFC and FC curves at low applied magnetic fields and temps. in several BSCCO samples; i.e., ZFC curves showed stronger supercond. than ZFC curves. This is in clear contrast to YBCO ceramics. Besides, the studied curves for BSCCO ceramics presented a much weaker dependence on cooling conditions than ones corresponding to YBCO. The authors also made a semi-quant. interpretation of the anomalous inversion through the investigation of the internal magnetic field.

~4 Citings

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240. Magneto-optical imaging of transport current densities in superconductors

By Crabtree, G. W.; Welp, U.; Gunter, D. O.; Zhong, W.; Balachandran, U.; Haldar, P.; Sokolowski, R. S.; Vlasov, V. K.; Nikitenko, V. I.

Edited By: Hayakawa, Hisao; Enomoto, Youichi

From [Advances in Superconductivity VIII, Proceedings of the International Symposium on Superconductivity, 8th, Hamamatsu, Japan, Oct. 30-Nov. 2, 1995](#) (1996), 1, 445-450. Language: English, Database: CAPLUS

A technique for imaging the path and magnitude of the transport c.d. flowing in superconductors is described. Results are given for a 37-filament BSCCO 2223 powder-in-tube wire, showing a highly inhomogeneous current path within the filaments.

~0 Citings

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241. Effects of deformation and heat-treatment process on texture of Bi-2223/Ag superconducting tapes

By Guo, Xu; Wang, Chaoqun; Yuan, Guansen

From [Rare Metals \(Beijing\)](#) (1996), 15(4), 313-317. Language: English, Database: CAPLUS

The effects of deformation and heat-treatment on texture of BSCCO-2223/Ag tapes were investigated by using single orientation quant. texture anal. methods. The results show that when tapes were sintered at 835°C for 24~48 h, the texture developed quickly, and further prolonging sintering time had no significant influence on it. With the increase of deformation rate, the vol. fraction of c-axis texture was improved in linear form at first and then changed slowly. The highest vol. fraction of c-axis texture (vol.%) in these expts. is 33.49%.

~0 Citings

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242. Phase transitions and structural instability in HTSC compounds and related phases

By Titova, Svetlana G.; Balakirev, Vladimir F.; Pal-Val, Pavel P.; Pal-Val, Lidia N.; Irvine, John T. S.

From [Czechoslovak Journal of Physics](#) (1996), 46(Suppl., Pt. S3, [Proceedings of the 21st International Conference on Low Temperature Physics, 1996, Part S3](#)), 1417-1418. Language: English, Database: CAPLUS, DOI:10.1007/BF02562823

Lattice dimensions anomalies are investigated for different HTSC compds. (123- and 124-YBCO, 2201-, 2212- and 2223-BSCCO, 2223-TBCCO; LSCO, NCCO) and related phases (Y_2BaCuO_5 , CuO) by acoustic and X-ray powder diffraction measurements in temp. range T_c - 300 K. Two kinds of anomalies have been established for superconducting compds. only at $T_0 \approx T_c + 15$ K and $T_1 \approx 190$ -270 K, with each having a quite different nature. It is shown that T_0 increases and T_1 decreases as the crit. temp. increases. The values of T_0 and T_1 as functions of the distance between CuO_2 planes are obtained. Localization processes in the charge carrier subsystem are suggested to be assocd. with the T_1 anomaly.

~0 Citings

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243. Fabrication of Ag-clad BSCCO-2223 tapes using (Bi,Pb)2CuO4 and (Sr,Ca)2CuO3 precursors

By Sastry, P. V. P. S. S.; Parrell, J. A.; Feng, Y.; Larbalestier, D. C.; West, A. R.

From [Superconductor Science & Technology](#) (1996), 9(11), 1009-1013. Language: English, Database: CAPLUS, DOI:10.1088/0953-2048/9/11/014

A new precursor powder process for the fabrication of silver sheathed Bi(Pb)-2223 tapes by an oxide-powder-in-tube method is reported. The precursor powder is made from a mixt. of (Bi,Pb)₂CuO₄ and (Sr,Ca)₂CuO₃. Fully processed tapes with the overall compn. Bi_{1.7}Pb_{0.3}Ca₂Sr₂Cu₃O_x showed an homogeneous 2223 microstructure contg. only small amts. of second phases. A crit. c.d. of 8500 A cm⁻² (77 K, O T) was obtained for a 60 μm thick single-filament tape after a total reaction time of 160 h with two intermediate pressings.

~7 Citings

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244. The effect of cooling rates on transport current properties and the critical temperature of Ag-sheathed BSCCO-2223 superconducting tapes

By Lelovic, M.; Deis, T.; Eror, N. G.; Balachandran, U.; Haldar, P.

From [Superconductor Science & Technology](#) (1996), 9(11), 965-970. Language: English, Database: CAPLUS, DOI:10.1088/0953-2048/9/11/007

The transport current properties of Ag-sheathed (Bi, Pb)₂Sr₂Ca₂Cu₃O_y BSCCO-2223 superconducting tapes were analyzed as a function of cooling rate. Changing the cooling rate showed a pronounced effect on the transport current of the superconductor heat-treated at 810°η in a 7% O₂ atmosphere. Results indicated that, during fast cooling, the thin layer of BSCCO adjacent to the Ag sheath is under compression. The compressive stress causes microcracking and affects the alignment and interconnectivity of 2223 grains in the thin layer of BSCCO next to the silver sheath. This changes the current path through the high-crit.-current-d. region in the superconductor. A comparison between furnace-cooled tapes and slowly cooled tapes (10°C h⁻¹ to 780°C and then 1°C min⁻¹ to room temp.) showed that the latter attained two or three times higher I_c values. Based on this observation, a cooling schedule that includes several intermediate cooling steps is suggested. The effect of the lattice parameter on T_c was investigated. Behavior analogous to that of the 2212 phase was found, T_c was affected by changes in the c-axis of the 2223 phase. However, the effect was not as pronounced as it was in the 2212 phase.

~27 Citings

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245. Correlation between cold deformation and microcrack formation in BSCCO-2223 powder in tube superconductor

By James, M. P.; Ashworth, S. P.; Glowacki, B. A.

From [Applied Superconductivity](#) (1996), 4(1/2), 25-33. Language: English, Database: CAPLUS, DOI:10.1016/0964-1807(96)00010-5

This paper describes the result of a cold rolling deformation path on the microstructure and the longitudinal and transverse crit. currents of monofilamentary BSCCO-2223 tape produced via the oxide powder in tube (OPIT) process. The fully reacted BSCCO-2223 powder used in this expt. highlights the deformation mechanisms effect on the microstructure of the core, and hence the effect on the longitudinal and transverse crit. currents. Tapes with different sheath properties are produced by controlling the hardness of the pure silver sheath either by annealing at 500°C between rolling stages or by allowing the sheath to work harden throughout the deformation path. The results show that the ultimate core d. depends on the hardness of the sheath and that the max. core d. is reached while the tape is still relatively thick. Microscopy shows that continued rolling after the core has reached its max. d. results in the prodn. of transverse cracks in the core. The crit. current measurements show that these cracks severely limit the potential longitudinal crit. current of the superconductor. A softer sheath allowed a greater redn. in thickness before transverse microcracking became severe, while a harder sheath enabled a higher core d. to be reached. This technique of controlling sheath hardness suggests possible improvements in the deformation processing of OPIT produced superconducting BSCCO-2223 tapes.

~6 Citings

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246. Effect of Au and Mg addition to Ag sheath on microstructure and superconducting properties of BSCCO-2223 tapes

By Yoo, Jaimoo; Chung, Hyungsik; Ko, Jaewoong; Kim, Haidoo

From [Physica C: Superconductivity \(Amsterdam\)](#) (1996), 269(1&2), 109-114. Language: English, Database: CAPLUS, DOI:10.1016/0921-4534(96)00439-X

Ag-Mg, Ag-Pd-Mg, and Ag-Au-Mg alloys were studied as alternative sheath materials to pure Ag for powder-in-tube (PIT) processing of **BSCCO-2223** tape. These alloys were extruded into hollow tubes (OD: 12.7 mm, ID: 9.5 mm, 200 mm long), and were studied for sausaging effect, microstructure, and compatibility (I_c measurement) with **2223 BSCCO** superconductor during the processing. The alloying of Au and Pd to Ag increased the resistivity but is not very effective in increasing the hardness. The addn. of a small quantity of Mg to Ag-Au and Ag-Pd increased the hardness significantly due to dispersion hardening. The use of Ag-Au-Mg alloys as the sheath materials improved the uniformity of **BSCCO** core thickness and mech. strength without any deterioration of supercond. Microstructural studies of the **BSCCO-2223/Ag-Au-Mg** tapes revealed a more dense and aligned **BSCCO** structure particularly along the sheath-core interface.

~19 Citings

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247. Liquid helium boil-off measurements of heat leakage from sinter-forged **BSCCO** current leads under DC and AC conditions

By Cha, Y. S.; Niemann, R. C.; Hull, J. R.; Youngdahl, C. A.; Lanagan, M. T.; Nakade, M.; Hara, T.
From *Advances in Cryogenic Engineering* (1996), 41(Pt. A), 603-610. Language: English, Database: CAPLUS, DOI:10.1007/978-1-4613-0373-2_78

Liq. helium boil-off expts. were conducted to det. the heat leakage rate of two sinter-forged **BSCCO 2223** high-temp. superconductor current leads. The expts. were carried out under both d.c. and a.c. conditions and with and without an intermediate heat intercept. Current ranges were 0-500 A for d.c. tests and 0-1,000 A_{rms} for a.c. tests. The leads were self-cooled. The results show that magnetic hysteresis (a.c.) losses for both the **BSCCO** leads and for a low-temp. superconductor current jumper were small for the current range covered in the present expts. It has been demonstrated that significant redn. in heat leakage rate (liq. helium boil-off rate) is realized by using **BSCCO** superconductor leads. At 100 A, the measured heat leakage rate of the **BSCCO**/copper binary lead was $\approx 29\%$ of that of a conventional copper lead. Further redn. in liq. helium boil-off rate was achieved by using an intermediate heat intercept. For example, At 500 A, the measured heat leakage rate of the **BSCCO**/copper binary lead was only 7% of that of the conventional copper lead when an intermediate heat intercept was employed.

~0 Citings

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248. Optimization of critical current density for **BSCCO (2223)** Opit tapes by increasing contact length between the core and sheath

By Prorok, B. C.; Balachandran, U.; Iyer, N.; Prorok, B. C.; Eror, N. G.; Lelovic, M.; Deis, T. A.; Krishnaraj, P. K.
From *Microstructural Science* (1996), 23(Advances and Applications in the Metallography and Characterization of Materials and Microelectronic Components), 73-76. Language: English, Database: CAPLUS

Recent developments indicated that current which is passed through Ag-composite tapes in the **BSCCO (2223)** system flows in a thin layer of the superconductor near its interface with the Ag sheath. In the transverse cross-section of the tape a length of interface between the superconducting core and Ag sheath can be measured. This length is deemed the interface Perimeter Length (IPL) and results indicate an increase of IPL results in a proportional increase in crit. current and crit. c.d. for the same cross-sectional area.

~0 Citings

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249. Electromagnetic mechanical properties of stainless steel reinforced **BSCCO-2223** silver sheath tape

By Okura, Kengs; Ueyama, Sofu; Sato, Kenichi; Watanabe, Kazuo; Awaji, Satoru
From *Tohoku Daigaku Kinzoku Zairyo Kenkyusho Kyojiba Chodendo Zairyo Kenkyu Senta Nenji Hokoku* (1996), 106-109. Language: Japanese, Database: CAPLUS

Magnetomech. characteristics of Ag-sheath Bi-type high-temp. superconductors is studied by a 15T bitter magnet on the effect of co-winding with stainless steel as a reinforcement. The hoop strain by currency in magnetic field at 15T showed 425-500 μm without and 330-410 μm with SUS-reinforcement. The hoop strain by the hoop stress shows slight deviation from linearity for increased stress and the elastic modules to be 115 GPa with and 92 GPa without SUS tape are calcd. by the slop of the correlation. The use of stainless steel for reinforcement in superconductor coil winding is thus effective in increase of the elasticity.

~0 Citings

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250. Different epitaxial growth modes of Bi₂Sr₂Ca₂Cu₃O_x on MgO

By Ohkubo, M.; Brecht, E.; Linker, G.; Geerk, J.; Meyer, O.

From [Applied Physics Letters](#) (1996), 69(4), 574-576. Language: English, Database: CAPLUS, DOI:10.1063/1.117757

The epitaxial growth of Bi₂Sr₂Ca₂Cu₃O_x (BSCCO 2223) films was realized on (001)MgO with a cylindrical sputtering gun. The 2223 films with the c axis perpendicular to (001)MgO exhibit three types of in-plane epitaxial relations, i.e., [100]BSCCO(100)MgO, [100]BSCCO(150)MgO, and [100]BSCCO(110)MgO. Individual domains possess resp. in-plane mosaic distributions, which manifest that different epitaxial growth modes take place.

~7 Citings

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251. Electromechanical properties of monolithic and core reinforced composite BSCCO-2223 tapes (BSCCO tapes)

By Salib, Sherif Eskander

From [No Corporate Source data available](#) (1995), 157 pp.. Language: English, Database: CAPLUS

~0 Citings

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252. Critical current versus field behavior in silver/BSCCO-2223 tapes with different critical currents

By Gherardi, Laura; Caracino, Paola; Coletta, Giacomo; Spreafico, Sergio

From [Materials Science & Engineering, B: Solid-State Materials for Advanced Technology](#) (1996), B39(1), 66-70.

Language: English, Database: CAPLUS, DOI:10.1016/0921-5107(95)01532-9

The dependence of J_c upon applied magnetic field has been analyzed in BSCCO-2223 tapes with different geometrical structures of the superconducting core. The samples, prep'd. by the PIT (powder-in-tube) method, and rolled down to tapes of different thickness, were annealed up to three times with intermediate mech. working. All measurements were carried out at 77 K, in magnetic fields up to 1 T, applied both parallel and perpendicular with respect to the transport current. Several samples with the same J_c and different I_c and superconducting core thickness were measured and compared. All samples showed a qual. similar "memory effect", with higher values of J_c measured with decreasing magnetic field, but remarkable differences in the low fields regime, where thinner tapes (lower I_c) showed a faster decay of J_c with B compared with the thicker ones. A simple semi-quant. explanation, taking into account the self-field of the tapes, was well supported by tests carried out in a special exptl. arrangement so designed as to allow one to characterize the "true" zero self-field behavior of the material.

~1 Citing

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253. Torsional texturing of superconducting oxide composite articles

By Christopherson, Craig John; Riley, Gilbert N., Jr.; Scudiere, John

From [PCT Int. Appl.](#) (1996), WO 9608045 A1 19960314, Language: English, Database: CAPLUS

A method of texturing a multifilamentary article having filaments comprising a desired oxide superconductor or its precursors by torsionally deforming the article is provided. The texturing is induced by applying a torsional strain which is at least ~0.3 and preferably at least ~0.6 at the surface of the article, but less than the strain which would cause failure of the composite. High-performance multifilamentary superconducting composite articles having a plurality of low-aspect-ratio, twisted filaments with substantially uniform twist pitches of 0.25-25 mm, each comprising a textured desired superconducting oxide material, may be obtained using this texturing method. If tighter twist pitches are desired, the article may be heat treated or annealed and the strain repeated as many times as necessary to obtain the desired twist pitch. It is preferred that the total strain applied per step should be sufficient to provide a twist pitch tighter than 5 times the diam. of the article, and twist pitches 1-5 times the diam. of the article are most preferred. The process may be used to make a high-performance multifilamentary superconducting article, having a plurality of twisted filaments, in which the degree of texturing varies substantially in proportion to the radial distance from the center of the article cross section, and is substantially radially homogeneous at any given cross section of the article. Round wires and other low-aspect-ratio multifilamentary articles are preferred forms. The invention is not dependent on the melting characteristics of the desired superconducting oxide. Desired oxide superconductors or precursors with micaceous or semi-micaceous structures are preferred. When used in connection with desired superconducting oxides which melt irreversibly, it provides multifilamentary articles that exhibit high d.c. performance characteristics and a.c. performance markedly superior to any currently available for these materials. In a preferred embodiment, the desired superconducting oxide material is BSCCO 2223.

~2 Citings

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254. AC losses in silver clad high T_c superconducting tapes

By Ashworth, S. P.; Ciszek, M.; Campbell, A. M.; Liang, W. Y.; Glowacki, B. A.

From [Chinese Journal of Physics \(Taipei\)](#) (1996), 34(2, Pt. 2), 232-242. Language: English, Database: CAPLUS

Superconductors in changing magnetic fields and/or carrying varying transport currents exhibit energy losses. The study of these losses is of importance in the technol. important Ag clad tapes. The authors discuss the mechanisms of these losses, in both the superconductor and Ag. The authors then describe the measurement technique widely used in detg. these losses as well as the potential problems with this technique. Illustrative loss data are presented for three types of **BSCCO-2223** tape (mono-core, multi-filamentary and rod-in-tube) carrying a.c. transport current. Data are also presented for tapes carrying a.c. transport current in the presence of applied a.c. and d.c. magnetic fields, as would be found in a no. of applications of these materials.

~3 Citings

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255. Anomalous inversion of voltage versus current curves in ZFC and FC conditions in **BSCCO ceramic superconductors**

By Lopez, J.; Mune, P.

From [Physica C: Superconductivity \(Amsterdam\)](#) (1996), 261(1&2), 173-178. Language: English, Database: CAPLUS, DOI:10.1016/0921-4534(96)00161-X

An anomalous inversion of the voltage vs. current curves measured in zero-field cooling (ZFC) and field-cooling (FC) conditions at low applied magnetic field was found in several Pb-**BSCCO** (2223) ($\text{Bi}_{1.6}\text{Pb}_{0.4}\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_y$) ceramic superconductors. At low magnetic-field values the ZFC curves are unexpectedly below the corresponding FC ones. This is in contrast with YBCO ceramic where the order is reversed. Results are discussed in terms of intergranular crit. current and the effect on the weak-link array of the internal magnetic field. Pinning energies dependences with current and magnetic field and temp. for both cooling conditions were also performed.

~1 Citing

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256. Vortex fluctuations in **BSCCO and YBCO**

By Persico, V.; Cataudella, V.; Fontana, F.; Minnhagen, P.

From [Physica C: Superconductivity \(Amsterdam\)](#) (1996), 260(1&2), 41-51. Language: English, Database: CAPLUS, DOI:10.1016/0921-4534(96)00141-4

The role of 2-dimensional vortex fluctuations was studied in **BSCCO-2223** and YBCO films. Resistance vs. temp. and current-voltage characteristics are discussed in terms of the Ginzburg-Landau Coulomb gas model. The anal. is able to ext. new interesting information about the interplane coupling (2-dimensional-3D crossover) both for **BSCCO-2223** and YBCO. Also strong evidence that 2-dimensional vortex fluctuations play an important role for **BSCCO-2223** is given.

~13 Citings

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257. Deformation state effects on the J_c of **BSCCO tapes**

By Blumenthal, W. R.; Zhu, Y. T.; Lowe, T. C.; Asaro, R. J.

From [Physica C: Superconductivity \(Amsterdam\)](#) (1996), 260(1&2), 33-40. Language: English, Database: CAPLUS, DOI:10.1016/0921-4534(96)00136-0

This study studied the feasibility of improving J_c by increasing the shear and compressive stresses in the Ag-sheathed $\text{Bi}_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{10+x}$ (**BSCCO-2223**) tapes during the rolling. To study the effects on the J_c of the stress state during rolling, specific stress states were imposed by rolling the **BSCCO** tapes embedded at different locations within thick steel blocks. Pure compression loading was achieved in the center plane of the blocks, while a combined compression-shear loading state was produced away from the center plane. Higher compressive hydrostatic stress at the tape edge was obtained by confining the tape width. Tapes deformed with a shear stress component exhibited higher J_c values than tapes subjected to pure compression. The compressive hydrostatic stress reduced the porosity in the oxide near the tape edge and, as a consequence, increased the J_c value.

~8 Citings

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258. Direct evidence for residual, preferentially oriented cracks in rolled and pressed Ag-clad BSCCO-2223 tapes and their effect on the critical current density

By Parrell, J. A.; Polyanskii, A. A.; Pashitski, A. E.; Larbalestier, D. C.

From [Superconductor Science & Technology](#) (1996), 9(5), 393-398. Language: English, Database: CAPLUS, DOI:10.1088/0953-2048/9/5/010

The authors have studied the connectivity of rolled and pressed Ag-sheathed $(\text{Bi,Pb})_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_x$ tapes through three deformation and heat treatment cycles using magneto-optical imaging. In pressed samples, a transport crit. c.d. of $\sim 11 \text{ kA cm}^{-2}$ (77 K, 0 T) was reached after two heat treatment steps, and increased to $\sim 21 \text{ kA cm}^{-2}$ after a third heat treatment. Crit. c.d. values in rolled samples also reached $\sim 11 \text{ kA cm}^{-2}$ after two heat treatments, but decreased to $\sim 4 \text{ kA cm}^{-2}$ after subsequent deformation and third heat treatment. Magneto-optical imaging using fields applied perpendicular to the rolling plane revealed that flux penetrated the superconducting core mainly through defects oriented perpendicular to the direction of current flow in rolled samples, and parallel to the direction of current flow in pressed samples. In those samples which had received more than one heat treatment, the flux is believed to penetrate through cracks produced during the deformation steps which do not heal during the subsequent heat treatments due to lack of sufficient residual liq. phase.

~75 Citings

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259. The role of silver during the BSCCO 2223 phase growth

By Caracino, Paola; Gherardi, Laura; Catti, Michele; D'Acci, Elena

From [Advances in Science and Technology \(Faenza, Italy\)](#) (1995), 8(Superconductivity and Superconducting Materials Technologies), 473-479. Language: English, Database: CAPLUS

The aim was to study the effect of Ag on the growth of Bismuth-2223 phase in thin Ag-sheathed tapes. By monitoring the reaction with XRD and DTA it was possible to show that the presence of Ag modifies the thermal behavior of the reactants. The effect is substantially to extend the temp. range where the liq. phase is present, so promoting the 2223 phase growth. DTA was most useful for studying the annealing conditions and the phase growth. In fact, the DTA curve obtained on precursor powder can give indications for the selection of the annealing temp. and, during the reaction, for verifying the degree of conversion to 2223 phase.

~0 Citings

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260. Application of sinter-forged Pb-BSCCO 2223 bars to 1500-A A.C. power utility service as high-frequency current leads in a 77-4 K temperature gradient

By Balachandran, U.; Youngdahl, C. A.; Lanagan, M. T.; Dorris, S. E.; Picciolo, J. J.; Cluff, J.; Brent, T.; Marinelli, M.; Fisher, B.; et al.

From [Applied Superconductivity](#) (1995), 3(6), 313-320. Language: English, Database: CAPLUS, DOI:10.1016/0964-1807(95)00076-3

Two assemblies of Pb-BSCCO 2223 superconductor bars were produced for use in a.c. connections between utility system lines at room temp. and a fault-current limiter operating at 4 K. Each assembly, consisting of 4 parallel bars arranged within a 100 mm-diam. boundary, delivered 1500 A (peak), 50-60 Hz a.c. through the 77-4 K range of the temp. gradient while dissipating $< 0.3 \text{ W}$. The sinter-forged bars displayed d.c. crit. current densities of $950\text{-}1300 \text{ A cm}^{-2}$ at 77 K and $> 5000 \text{ A cm}^{-2}$ at 4 K; magnetic field sensitivity was relatively small. Although thermal cond. tests showed values much higher than those found in the literature for polycryst. Pb-BSCCO 2223 made by other processes, this undesirable result was counterbalanced by the relatively high values of crit. current, which enabled the use of bars with smaller cross-sectional areas. Typical 50-Hz a.c. power losses at 77 K in each bar (with a cross-sectional area of 0.54 cm^2) were 1 mW/cm of length at 310 A and 1.75 mW/cm at 375 A. Losses were much smaller at 4 K. Bars were 25 cm long, including ends that carried Ag contacts sinter forged to the ceramic, with a 21. cm Ag-free length in the thermal gradient between the fixed-temp. terminals. Thermal efficiency of the assemblies was assessed by He boil-off tests.

~1 Citing

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261. Influence of pyrolyzation temperature on final characteristics of BSCCO ceramic produced by spray-frozen, freeze drying method

By Badica, P.; Aldica, G.; Alexeev, A. F.; Gridasova, T. Y.; Morozov, V. V.

From *Journal of Materials Science Letters* (1996), 15(3), 187-8. Language: English, Database: CAPLUS, DOI:10.1007/BF00274446

Precursor $\text{Bi}_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_x$ (BSCCO; 2223-phase) powders were prepd. from nitrate soln. mixt. using a spray-frozen, vacuum freeze-drying method with subsequent pyrolysis in air for 20 min at 800 and 830°. Pellets were prepd. from the two powders by sintering at 850° for 60-315 h. The $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_x$ (2212-phase) and 2223 phase contents of the pellets were detd. by x-ray diffraction. The elec. resistivity was detd. by the 4-probe method. Higher quality 2223-phase pellets were prepd. from the 830°-pyrolyzed powders than from the 800°-pyrolyzed powders, even if the sintering times were longer. The final 2212 and 2223 phase contents, as well as the superconducting transition parameter for sintered pellets, are dependent on the starting non-superconducting phases, the phase content distribution in precursor powder and the behavior during sintering.

~1 Citing

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262. Spatial and temporal temperature and voltage signals of a silver-sheathed BSCCO tape undergoing a quench: experimental and analytical results

By Iwasa, Yukikazu; Yunus, Mamoon I.

From *Institute of Physics Conference Series* (1995), 148 (Vol. 1), 447-50. Language: English, Database: CAPLUS

We present exptl. and anal. temp. and voltage signals, both spatial and temporal, of a silver-sheathed BSCCO-2223 tape quenching along the tape's length. Exptl. results, obtained at temps. of 50 K and 60 K in zero background magnetic field for transport currents up to 70 A, agree well with those based on theory.

~0 Citings

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263. Current-voltage characteristics of BSCCO-2212 wires and BSCCO-2223 tapes

By Lehndorff, B.; Fischer, B.; Hortig, M.; Theisejans, R.; Piel, H.

From *Institute of Physics Conference Series* (1995), 148 (Vol. 1), 411-14. Language: English, Database: CAPLUS

BSCCO-2212 wires and BSCCO-2223 tapes have been prepd. using the conventional powder in tube method but with an alternative rolling process instead of drawing. As a std. characterization J_c was measured at 77 K. Crit. current densities of 25,000 A/cm² for the BSCCO-2223 tapes and 5,000 A/cm² for the BSCCO-2212 wires were obtained at 77 K. In order to examine the pinning properties current-voltage characteristics have been measured at temps. between 4.2 K and 100 K in magnetic fields up to 8 T. At temps. below 40 K resp. 20 K for the 2212-phase the magnetic field dependence of the crit. c.d. is weak after an initial drop. At higher temps. the crit. c.d. decreases exponentially at magnetic fields above 1 T. In this region the I-V-characteristics show power law behavior as expected for the thermally activated flux flow (TAFF) mechanism. The anisotropy of J_c for different orientations of the magnetic field is high for the tape material and nearly zero for the wires as expected from the 2-d structure of the material and the geometry of the samples.

~0 Citings

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264. Effects of the time sequence of cold working on critical current densities of Ag-alloy sheathed BiPb2223 tapes

By Penny, M; Beduz, C; Yang, Y; Al-Mosawi, M; Scurlock, R; Wroe, R

From *Institute of Physics Conference Series* (1995), 148 (Vol. 1), 383-6. Language: English, Database: CAPLUS

The effect of the time sequence of cold working/sintering, on transport J_c has been studied. The results on the variation of J_c with sintering time prior to the second cold rolling, t_{s2} , are presented. Ag-Alloy sheathed, BSCCO-2223 tapes produced by PIT method were used in this study. The tapes were cold rolled to 240-260 μm and processed at 825-840°C with two intermediate cold rollings. The sintering time prior to the first intermediate cold rolling was kept const. at 20 h, however, prior to the second cold rolling, the tape was sintered for a time, t_{s2} , from 20 to 35 h. The tapes were then sintered to give a total sintering time of 140 h. Tapes produced with $t_{s2}=27\text{h}$ had the highest J_c of $20 \times 10^3 \text{ Acm}^{-2}$ (77 K, self field). This tape had an I_c of 23.3 A in a monofilamentary geometry. The processing was monitored at the stages of intermediate mech. work by SEM and XRD, in order to reveal any significant mechanism of enhancement in J_c . It seems that the percentage of the 2223 phase and the grain size before mech. work is performed, has a very sensitive influence on the enhancement mechanism related to J_c capabilities.

~0 Citings

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265. Transverse inhomogeneities of Pb/BSCCO 2223 tapes from the core-sheath interface to the center of the core

By Yi, Z.; Law, L.; Fisher, S.; Beduz, C.; Yang, Y.; Scurlock, R G.; Riddle, R.

From [Institute of Physics Conference Series \(1995\)](#), 148 (Vol. 1), 379-82. Language: English, Database: CAPLUS

The percentage of converted 2223 phase and the Vicker's microhardness of the core have been measured across the thickness of Pb/BSCCO 2223 tapes sintered for up to 350 h. We have found that there is a 2223 phase gradient from the sheath-core interface to the center of the core. The rate of the phase conversion is much faster at the interface than at the center. The microhardness is found to decrease from a max. at the core-sheath interface to a min. at the center.

~2 Citings

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266. The effect of lubrication on sequentially pressed long lengths of BSCCO-2223 powder in tube tape.

By James, M. P.; Ashworth, S. P.; Glowacki, B. A.; Garre, R.; Conti, S.

From [Institute of Physics Conference Series \(1995\)](#), 148 (Vol. 1), 343-6. Language: English, Database: CAPLUS

This paper describes the effect of lubricating the silver surface during pressing of BSCCO-2223 superconducting tape. The effect of this lubricant is to lower the coeff. of friction at the tool-workpiece interface which lowers the av. pressure at the tool-workpiece interface required for the onset of plastic flow of the tape. Thus wider tapes can be produced without increasing the pressing force. This novel method of maximizing the silver to superconductor interface area has been developed due to the considerable evidence that during sintering texture development is more pronounced at the interface between the ceramic core and the silver sheath.

~0 Citings

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267. Current limiting mechanisms in Bi-Sr-Ca-Cu-O tapes

By Larbalestier, D.C.; Babcock, S.E.; Cai, X.Y.; Dorris, S.E.; Edelman, H.S.; Gurevich, A.; Parrell, J.A.; Pashitski, A.; Polak, M.; et al.

From [Institute of Physics Conference Series \(1995\)](#), 148 (Vol. 1), 29-34. Language: English, Database: CAPLUS

Three recent expts. addressing the current limiting mechanisms of polycryst. BSCCO compds. are summarized. In the first the irreversibility field (H^*) of a BSCCO-2223 tape was found to be a monotonically increasing function through 3 heat treatments and two deformation cycles. It is widely thought that H^* is detd. by the intragrain flux pinning properties but since the relevant flux pinning defects are likely to be ionic defects, it is surprising that they would create a continuous increase of H^* in BSCCO-2223 since the single phase field is so small. The second expt. measured H^* for a strongly coupled 8° [001] tilt boundary in a BSCCO-2212 bicrystal. H^* and the intergrain J_c were both slightly depressed in comparison to the intragrain properties, suggesting that low angle grain boundaries are one source of a varying H^* . The third expt. used magneto-optical imaging (MOI) to observe the current paths in BSCCO-2223 tapes under both magnetization and transport current flow. Some current, particularly that near the Ag sheath, flowed over the whole sample length in both cases but there were many short range current loops flowing over a few grain lengths ($\approx 50 \mu\text{m}$) in the central region of the tape in the low-elec.-field (E) magnetization expt., these being almost eliminated in the higher-E transport measurement. Extended E-J curves show that J is a strong function of E, consistent with the MOI data, which addnl. show that both the local current paths and the local c.d. are highly variable, implying that many barriers to current flow have a strong E-dependence. The expts. show that current limiting mechanisms exist on many length scales and point to two important conclusions, first that BSCCO-2223 tapes are a long way from their full optimization and second that the path to this optimization lies through a better understanding of their defect materials science. 20 Refs.

~5 Citings

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268. Transport critical current density above 105 A cm⁻² at 77 K in Bi_{1.8}Pb_{0.4}Sr_{2.0}Ca_{2.2}Cu_{3.0}O_y superconducting tapes made by the Ag wire-in-tube method

By Lelovic, M.; Krishnaraj, P.; Eror, N. G.; Iyer, A. N.; Balachandran, U.

From [Superconductor Science & Technology \(1996\)](#), 9(3), 201-4. Language: English, Database: CAPLUS, DOI:10.1088/0953-2048/9/3/012

Transport crit. c.d. (J_c) is a limiting factor in the practical application of $(\text{Bi,Pb})_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_y$ (BSCCO-2223) high-temp. superconducting materials. The min. requirement is for a J_c of 10^5 A cm^{-2} in long wires and tapes, at 77 K and in a high magnetic field. The issue of current distribution inside Ag-sheathed tapes has been resolved by showing that the region of high crit. d. is next to the silver. In this paper, the authors report a J_c value $> 10^5 \text{ A cm}^{-2}$ at 77 K in a self-field in $\text{Bi}_{1.8}\text{Pb}_{0.4}\text{Sr}_{2.0}\text{Ca}_{2.2}\text{Cu}_{3.0}\text{O}_y$ superconducting tapes made by the Ag wire-in-tube method, in which a silver wire was introduced into the silver tube. The silver wire extended along the entire length of the tape and reduced the difference between the nominal cross section of the superconductor and its actual current-carrying cross section. At 77 K and self-field, a max. J_c of $2 \times 10^5 \text{ A cm}^{-2}$ (crit. current $I_c = 22 \text{ A}$) was measured after three pressing cycles at 800°C in 7% O_2 atmosphere. The av. thickness of the superconducting layer between the sides of silver layers was of the order of 1-2 μm and the width was 3.6 mm. This study confirms that the current-carrying region in BSCCO tapes is the layer adjacent to the Ag sheath. Previously it was shown that the superconductor core for thicker superconductor layers ($\sim 70 \mu\text{m}$) does not carry significant current.

~32 Citings

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269. Controlled decomposition and reformation of the 2223 phase in Ag-clad $(\text{Bi,Pb})_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_x$ tapes and its influence on the microstructure and critical current density

By Parrell, J. A.; Feng, Y.; Dorris, S. E.; Larbalestier, D. C.

From *Journal of Materials Research* (1996), 11(3), 555-64. Language: English, Database: CAPLUS, DOI:10.1557/JMR.1996.0068

The decompn. of almost fully reacted $(\text{Bi,Pb})_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_x$ (BSCCO-2223) tapes caused by heating in 1 atm of pure O_2 at 825° was studied. Partially decomp. 2223 tapes to a mixt. of $\text{Bi}_2\text{Sr}_2\text{Ca}_1\text{Cu}_2\text{O}_6$, $(\text{Ca,Sr})_2\text{PbO}_4$, and other secondary phases reduced the crit. c.d. (77 K, 0 T) from $\sim 20 \text{ kA/cm}^2$ to nearly zero. Reheating the tapes in 7.5% O_2 restored the 2223 phase and, while there was some degrdn. of the 2223 grain alignment due to residual secondary phase growth, the crit. c.d. was also restored to nearly its original value. The authors hypothesize that such a decompn./reformation process can be useful in increasing the connectivity and relative d. of polycryst. 2223, by encouraging the formation of a liq. phase which heals residual cracks in the BSCCO core.

~8 Citings

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270. Percolative current flow in Ag-sheathed BSCCO-2223 tapes: Manifestations, visualization and origins.

By Larbalestier, D. C.; Cai, X. Y.; Edelman, H.; Feng, Y.; Karuna, M.; Parrell, J.; Pashitski, A.; Polyanskii, A.

Edited By: Tachikawa, Kyoji

From *Critical State in Superconductors, Proceedings of Topical International Cryogenic Materials Conference, Honolulu, Oct. 24-26, 1994* (1995), 74-80. Language: English, Database: CAPLUS

Recent work at the University of Wisconsin on the understanding of the factors controlling the crit. c.d. of Ag-sheathed BSCCO-2223 tapes is summarized. Two new techniques (microslicing of the tape and magneto optical imaging) were used to measure the local crit. c.d. and to visualize the effective current path in the superconducting state. Local variations of the grain-to-grain electromagnetic connectivity cause percolative current flow and greatly limit the overall crit. current. Therefore, increasing the active cross-section of tapes by understanding and controlling the defects that inhibit good electromagnetic coupling is the most promising way to raise the overall crit. c.d. of BSCCO tapes.

~0 Citings

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271. Processing with colloidal Ag particles in hot forged Ag-coated BSCCO-2223 composites

By Medendorp, Nicholas W., Jr.; Bowman, Keith J.; Trumble, Kevin P.

From *Journal of Electronic Materials* (1995), 24(12), 1903-5. Language: English, Database: CAPLUS, DOI:10.1007/BF02653007

Multilayer Ag-BSCCO-2223 composites were fabricated by open-die hot forging to study the role of Ag in densification and microstructural development. The composite microstructures were produced using Ag-coated BSCCO particles produced from a chem. pptn. technique. Grain alignment and Ag microstructure effects were characterized via optical and electron microscopy.

~1 Citing

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272. AC susceptibility study of the intergranular irreversibility line in BSCCO ceramic superconductors

By Gonzalez, J. L.; Mune, P.; Flores, L. E.; Altshuler, E.

From [Physica C: Superconductivity \(Amsterdam\) \(1995\), 255\(1&2\), 76-80](#). Language: English, Database: CAPLUS, DOI:10.1016/0921-4534(95)00585-4

The intergranular irreversibility line of granular BSCCO-2223 sample was found by measuring the AC susceptibility. Bi Pb Ca Sr Cu O. The data are compared with the analogous ones for a YBCO ceramic. The measured values agree with the ones detd. through the giant flux-creep theory adapted to the intergranular case, choosing appropriate parameters. This result suggests that the change from non-dissipative to dissipative states can be regarded as an intergranular pinning-depinning transition.

~6 Citings

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273. Microstructural and mechanical characterization of bulk BSCCO (2223) superconductor

By Tampieri, A.; Celotti, G.; Guicciardi, S.; Melandri, C.

From [Materials Chemistry and Physics \(1995\), 42\(3\), 188-94](#). Language: English, Database: CAPLUS, DOI:10.1016/0254-0584(95)01577-9

Bi_{1.84}Pb_{0.34}Sr_{1.91}Ca_{2.03}Cu_{3.06}O_x bulk superconductor was prepd. by hot pressing and pressureless sintering reaching relative d. values in the 96-99 and 85-90% range, resp. The hot-pressed specimens exhibited a textured microstructure with the c-axis preferentially aligned parallel to the direction of sintering pressure application, while the plastic flow into the particles, during hot pressing, favors the grain growth in the direction perpendicular to the pressure application. Both d. and microstructure texturing results were greatly influenced by sintering temp. and pressure. More specifically for pressureless sintered samples, high cold uniaxial pressure was first applied to prep. highly dense green bodies characterized by unusually high degree of texture orientation. They were subsequently pressureless sintered to form links between grains by the activation of diffusion process and partial melting at the grain boundary. Mech. characterizations, supported by microstructural evaluations, underline the anisotropic character of the material, its intrinsic brittleness and the low hardness.

~16 Citings

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274. Generation of 14.0 T at 4.2 K and 23.4 T at 27 K with a high-temperature superconductor coil in a 22.54 T background field

By Ohkura, K.; Sato, K.; Ueyama, M.; Fujikami, Jun; Iwasa, Y.

From [Applied Physics Letters \(1995\), 67\(13\), 1923-5](#). Language: English, Database: CAPLUS, DOI:10.1063/1.114569

The 4.2 K and 27 K current-carrying performance of a high-temp. superconducting (HTS) coil was measured in background fields up to 22.54 T generated by a hybrid magnet (Hybrid III) at the MIT Francis Bitter National Magnet Lab. The coil, 40 mm winding i.d., 108 mm winding o.d., and 113 mm high, consists of 17 double pancakes, each wound with silver-sheathed BSCCO-2223 tapes. Each pancake is the product of a react-and-wind method. In total, the test coil contains ~1200 m of BSCCO-2223 conductor weighing ~7 kg. Prior to the measurements in Hybrid III, the coil was tested in zero background field at 4.2-77 K. It was coupled to a Gifford-McMahon type cryocooler and at 15 K generated a peak field at 2.1 T; at 18 K, it generated 1.9 T, operating continuously for ~50 h. In a 22.54 T background field of Hybrid III, the coil reached crit. currents of 116.5 A ($[J_c]_{sc}$, crit. c.d. based on the BSCCO cross-sectional area only, of 261 A/mm²) at 4.2 K and 67 A ($[J_c]_{sc} = 150$ A/mm²) at 27 K, establishing record net fields at resp. temps. of 24.0 and 23.4 T for HTS magnets. These currents correspond to overall winding current densities of 47 and 27 A/mm². High-field crit. current data for short samples of the tape of the same formulation at 4.2 and 27 K are also presented. Although a $[J]_{sc}$ of 261 A/mm² at 24 T and 4.2 K for the test coil is significantly less than ~600 A/mm² for the short samples at the same operating point, if factors such as length, bending, and even differences in defining crit. current are considered, the coil and short samples have nearly the same crit. current performance. Electromagnetic stresses do not seem to have any neg. effects on coil performance. Record fields of 24.0 and 23.4 T were achieved after the test coil had experienced, over a period of 15 mo, 20 thermal cycles between room temp. and cryogenic temps.

~18 Citings

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275. On the magnetic behavior of BSCCO(2223) Ag tapes

By Cimberle, M. R.; Ferdeghini, C.; Fluekiger, R.; Giannini, E.; Grasso, G.; Marre, D.; Putti, M.; Siri, A. S.

From [Physica C: Superconductivity \(Amsterdam\) \(1995\), 251\(1&2\), 61-70](#). Language: English, Database: CAPLUS, DOI:10.1016/0921-4534(95)00371-1

Pressed and rolled **BSCCO(2223)** Ag tapes were widely characterized by SQUID magnetometry with the applied field both parallel and perpendicular to the c-axis. The main results can be summarized as follows: (1) at low temp. ($T = 5$ K), the anisotropy of the in-plane and out-of-plane current densities J_{ab}/J_c is 50; (2) the magnetic response of the tapes indicates that both intergranular (transport) and intragranular contributions to the magnetic moment are present; (3) the samples show a strong degn.; (4) the hysteresis loops show a certain degree of erratic behavior due to frequent jumps; (5) besides this erratic behavior, other anomalies of the hysteresis loops are present: in particular the anomalous field position of the maxima of the magnetization; (6) in bent samples, representing the intragranular magnetization only, all the anomalies disappear and the hysteresis loops are regular; (7) the intergranular magnetization, obtained by subtraction of the magnetic moments measured on the not-bent and bent sample, gives a c.d. which is irreversible for increasing and decreasing magnetic field, as seen also in transport measurements.

~27 Citings

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276. Synthesis and densification behavior of Bi-based superconducting powder by organic precursor

By Tampieri, A.; Celotti, G.

From *Journal of the European Ceramic Society* (1995), 15(8), 735-9. Language: English, Database: CAPLUS, DOI:10.1016/0955-2219(95)00046-W

BSCCO (2223) phase superconducting powder was synthesized by pyrolysis of a soln. of citrates contg. cations in the relative amts. required to prep. compds. with the nominal compn. $\text{Bi}_{1.84}\text{Pb}_{0.35}\text{Sr}_{1.9}\text{Ca}_{2.1}\text{Cu}_3\text{O}_x$. Starting from the pyrolyzed precursor, the prepn. of (2223) monophasic powder is realized in very short processing time of only 24 h. Reactions among components were investigated by thermogravimetric and DTA; the products obtained on treating powders at various temps. in the range 500-950°C were defined by XRD. The identification of the reaction intermediates that play a crucial role in the synthetic process was systematically performed, and a comparison with the solid-state reaction method was carried out. Hot pressing was performed in order to prep. highly dense superconducting materials. The densification behavior of the powder obtained by the citrate route was studied in comparison with the solid-state reacted one.

~0 Citings

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277. Temperature-dependent roles of inter- and intragrain current systems on the critical current and magnetization of **BSCCO-2223/Ag** tapes

By Paasi, Jaakko; Kottman, Peter; Polak, Milan

From *Physica C: Superconductivity (Amsterdam)* (1995), 249(3&4), 350-60. Language: English, Database: CAPLUS, DOI:10.1016/0921-4534(95)00326-6

The authors examine the role of inter- and intragrain current systems on the temp.-dependent crit. current and magnetization of **BSCCO-2223/Ag** tapes. Expts. were done by measuring the sample magnetization field with movable miniature Hall sensors. Both systems have their own irreversible characteristics. The overall level of the intergrain (transport) crit. c.d., J_c , was limited at both lower (<30 K) and higher temps. (30-95 K) by intergranular flux pinning, which seemed to be related to the max. Josephson current of the weak links. Also, the irreversible intragranular magnetization has an influence on the magnetic field dependence of the intergrain J_c : when the intragrain pinning is strong (as at lower temps.), the redn. of J_c in magnetic fields is moderate, and, when it is weaker (at higher temps.), the decrease of J_c in fields is strong. This is a consequence of the field dependence of the max. Josephson c.d. of the weak links, when the adjacent superconducting grains are in the mixed state.

~7 Citings

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278. Electrical and magnetic characterization of hot-extruded **BSCCO** tape samples

By Garre, R.; Conti, S.; Sparvieri, N.

From *Nuovo Cimento della Società Italiana di Fisica, D: Condensed Matter, Atomic, Molecular and Chemical Physics, Fluids, Plasmas, Biophysics* (1994), 16D(12), 2113-17. Language: English, Database: CAPLUS, DOI:10.1007/BF02471875

Ag/BSCCO-2223 phase tapes were prepd. with a new plastic deformation cycle. Starting from the hot extrusion of composite billets, hundreds of meters of tape 0.15 × 3 mm were obtained by drawing and rolling the extruded bars. The cross-section, monofilamentary with a central Ag insert, is quite regular along all the length. Samples from 30 cm to 100 cm in length were heat-treated at different temps. between 830° and 480° in Ar + 100% O₂ atm. Elec.-transport properties were tested at 77 K. J_c of 3000 A/cm² were usually achieved after first heat treatment. The superconducting properties were also tested by magnetic measurements using a vibrating sample magnetometer.

~0 Citings

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279. Magnetic characterization of hot-pressed BSCCO (2223) phase superconducting ceramic

By Tampieri, A.; Fiorani, D.; Sparvieri, N.; Celotti, G.; Testa, A.

From [Nuovo Cimento della Societa Italiana di Fisica, D: Condensed Matter, Atomic, Molecular and Chemical Physics, Fluids, Plasmas, Biophysics \(1994\), 16D\(10-11\), 1871-6](#). Language: English, Database: CAPLUS, DOI:10.1007/BF02462187

BSCCO (2223) phase superconductor, prep'd. by the traditional solid-state reaction route, was densified by hot pressing, yielding high-d. and textured-bulk materials. A correlation between processing parameters and inter-, intra-granular properties of the sample was performed through the evaluation of microstructural features and the study of elec. resistivity and magnetization behavior as a function of different temp. and magnetic field.

~0 Citings

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280. Preparation and analysis of electronic-transport properties of BSCCO-2223 platelets

By Persico, V.; Fontana, F.; Wang, Y. H.; Balestrino, G.

From [Nuovo Cimento della Societa Italiana di Fisica, D: Condensed Matter, Atomic, Molecular and Chemical Physics, Fluids, Plasmas, Biophysics \(1994\), 16D\(10-11\), 1715-21](#). Language: English, Database: CAPLUS, DOI:10.1007/BF02462165

High-quality single-phase thin platelets of BSCCO-2223 were produced by a novel method on thermal-gradient-enhanced KCl flux which allows the growth of the 2223-phase in an extremely short time interval compared to those reported in the literature. In-plane elec. resistivity measurements in zero applied magnetic field were performed. Exptl. data were analyzed and interpreted within the Aslamazov-Larkin theory of amplitude fluctuations and the Ginzburg-Landau Coulomb gas model of phase fluctuations. These theories seem to fit in a very reliable way the exptl. R(T) curves.

~0 Citings

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281. Magnetic granularity, percolation and preferential current flow in a silver-sheathed Bi_{1.8}Pb_{0.4}Sr₂Ca₂Cu₃O_{8+x} tape

By Pashitski, A. E.; Polyanskii, A.; Gurevich, A.; Parrell, J. A.; Larbalestier, D. C.

From [Physica C: Superconductivity \(Amsterdam\) \(1995\), 246\(1&2\), 133-44](#). Language: English, Database: CAPLUS, DOI:10.1016/0921-4534(95)00129-8

Magneto-optical imaging of the flux penetration into a Ag sheathed Bi_{1.8}Pb_{0.4}Sr₂Ca₂Cu₃O_{8+x} tape was used to ext. the current flow paths in a magnetic field applied perpendicular to the c-axis. Using the large aspect ratio of the plate-like grain structure and the slab geometry of the sample to simplify the current-flow geometry, the authors converted the magneto-optical signal into two-dimensional (2D) field and current distributions. The current patterns were very nonuniform and sensitive to weak magnetic fields of ~400-800 Oe, even at 10 K. Current streamlines show that the effective current-carrying cross-section of the tape strongly depends on the field. Magnetization currents flow preferentially near the Ag sheath, while the tape center supports mainly percolative and granular current patterns consisting of an array of macroscopic current loops whose long dimensions are of the order of the tape thickness. By comparing contour maps of the local J_c values with the microstructural images, the high-J_c regions correlate with colonies of well-aligned long grains which are preferentially located near the Ag interface, while the less aligned structure of smaller grains in the central part of the tape is assoc'd. with the granular behavior and much lower current-carrying capability. The wide distribution of the local J_c(x, y) revealed by magneto-optical imaging indicates that the performance of BSCCO-2223 tapes can be significantly improved if a larger fraction of well aligned grains can be produced more uniformly throughout the tape cross-section.

~99 Citings

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282. Magnetization current of a thin layer of Bi_{1.8}Pb_{0.4}Sr_{2.0}Ca_{2.2}Cu_{3.0}O_y near silver in Ag-sheathed BSCCO-2223 tapes

By Lelovic, M.; Krishnaraj, P.; Eror, N. G.; Balachandran, U.

From [Superconductor Science & Technology](#) (1995), 8(5), 336-40. Language: English, Database: CAPLUS,

DOI:10.1088/0953-2048/8/5/011

The thin superconducting region next to the silver sheath in Ag-sheathed **BSCCO-2223** tapes, which appears to be the high crit. c.d. region was studied. Magnetic hysteresis measurements were performed on the 10 μm thin layer of $\text{Bi}_{1.8}\text{Pb}_{0.4}\text{Sr}_{2.0}\text{Ca}_{2.2}\text{Cu}_{3.0}\text{O}_y$ near the silver sheath as a function of temp., intensity, and orientation of the applied field with respect to the tape. The full penetration depth, B^* , for a superconducting slab was found to have a power law dependence on temp. Correlating the magnetic and transport measurements for the 10 μm thin layer of $\text{Bi}_{1.8}\text{Pb}_{0.4}\text{Sr}_{2.0}\text{Ca}_{2.2}\text{Cu}_{3.0}\text{Y}_y$ near the silver sheath showed that the self-field for a transport crit. current of 20 A at liq. nitrogen temp. was ~ 0.04 T. Magnetization currents as a function of temp. and applied field oriented parallel and orthogonal to the thickness dimension of the tape, $J_c(\mu_0 H_{\text{app}}, T)$, were detd. from the magnetization loop width using a Bean model expression adapted for an orthorhombic sample. Only $J_c(\mu_0 h_{\text{app}}, T)$ values for an applied magnetic field greater than B^* were calcd. J_c values that were one order of magnitude higher than those previously reported were obtained.

~6 Citings

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283. Phase formation, interface reactions, local J_c variations and (001) twist boundaries in **BSCCO-2223** Ag-sheathed tapes

By Feng, Y.; Cai, X. Y.; Edelman, H.; High, Y. H.; Parrell, J.; Sung, Y. S.; Umezawa, A.; Hellstrom, E. E.; Larbalestier, D. C.

Edited By: Salama, Kamel; Chu, Ching-wu; Chu, Wei-kan

From [Proc. US-Jpn. Workshop High TC Supercond., 6th](#) (1994), 215-20. Language: English, Database: CAPLUS

Nonsuperconducting phases, particularly alk. earth cuprates, grow more readily than the desired **2223** phase, because the activation energy for their growth (~ 300 kJ/mol in air) is about a factor of 5 less than for the $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_x$ (2212) to **2223** conversion (~ 1.5 MJ/mol). The reaction to **2223** occurs preferentially at the Ag interface; continued growth occurs preferentially from the initial **2223** interface plates. An excellent diagnostic of the progress of the reaction is the field-dependent AC or DC susceptibility. Residual 2212 tends to cluster at (001) twist boundaries where it broadens the T_c transition and depresses J_c because of the need for c-axis transport in transmitting current from grain to grain. Strong texturing of the (001) planes of the **BSCCO** phases parallel to the Ag interface is seen, regardless of the Ag orientation. Short facets of non-(001) **BSCCO** planes accommodate local misalignments between the Ag and the (001) planes of the **BSCCO** phases. A new technique has been developed to measure the local crit. c.d. within **BSCCO-2223** tapes: large local variations and very high values can exist in tapes having only modest overall J_c .

~0 Citings

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284. Resistive transition and hysteresis effects in Ag/**BSCCO (2223)** coils

By Sciver, S. W. Van; Hascicek, Y. S.; Shoaff, P. V. Jr.; Weijers, H. W.

Edited By: Salama, Kamel; Chu, Ching-wu; Chu, Wei-kan

From [Proc. US-Jpn. Workshop High TC Supercond., 6th](#) (1994), 177-83. Language: English, Database: CAPLUS

In-field crit. current measurements are reported on two coils made from **BSCCO 2223**/Ag tape superconductor. One coil is a pancake wound powder-in-tube monocoil tape coil fabricated by the wind-and-react technique. The second coil is made from multicore powder-in-tube using a react-and-wind method. All data are acquired at 4.2 K with background magnetic fields to 9 T in both the co-axial and perpendicular orientation. The particular issues of interest include the details of the resistive transition such as the n-value and corrections for parallel currents. The magnetic field hysteresis effects were also investigated.

~0 Citings

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285. Design of experiment for J_c optimization on **BSCCO-2223** silver sheathed tapes

By Gherardi, L.; Caracino, P.

Edited By: Weber, Harald W

From [Proc. Int. Workshop Crit. Curr. Supercond., 7th](#) (1994), 545-8. Language: English, Database: CAPLUS

The manufg. process of high-T_c superconductor silver sheathed tapes made by "Powder In Tube" involves a large no. of phys. and chem. variables. Morphol. and compn. of precursors, but also samples dimension, mech. working and annealing conditions are all parameters that influence the quality of products. A systematic work of sintering and statistical anal. of the results were performed. Effects of nominal and actual phase compn. of the precursor powders, and their prodn. process, diam. of the drawn wire, thickness of tapes, temp. and total time of annealing have been statistically analyzed. The anal. of J_c was combined with X-ray analyses to monitor all the aspects of superconducting phase evolution. Only four among the six factors studied have a significant influence on J_c and not all the two-order interactions are negligible.

~0 Citings

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286. Role of silver addition on mechanical and superconducting properties of high-T_c superconductors

By Joo, J.; Singh, J. P.; Warzynski, T.; Grow, A.; Poeppel, R. B.

From [Applied Superconductivity](#) (1994), 2(6), 401-10. Language: English, Database: CAPLUS, DOI:10.1016/0964-1807(94)90087-6

The effect of Ag addns. on the mech. and superconducting properties of sintered bulk YBa₂Cu₃O_x (YBCO), Bi₂Sr_{1.7}CaCu₂O_x (BSCCO-2212), and Bi_{1.8}Pb_{0.4}Sr_{2.2}Ca₂Cu₃O_x (BSCCO-2223) was evaluated. Strength and fracture toughness of YBCO and BSCCO bars increased with increasing Ag content up to 30 vol.% Ag. Addn. of 30 vol.% Ag to YBCO increased strength from 87 to 136 MPa and fracture toughness from 1.82 to 3.9 MPa√m. Addn. of 30 vol.% Ag to 2212 and 2223 increased strength from 58 to 107 and 41 to 90 MPa, resp. Corresponding increases in fracture toughness were 1.89-2.79 and 1.09 to 1.94 MPa√m, resp. These improvements in strength and fracture toughness are believed to be due to the presence of Ag particles that may induce compressive stresses in the superconducting matrix and resist crack propagation by pinning the propagating cracks. The values of strength and fracture toughness of BSCCO-30 vol.% Ag specimens are comparable to those of monolithic BSCCO obtained by sinter forging, hot pressing, and hot isostatic pressing. However, the hardness of YBCO and BSCCO decreased with increasing Ag contents because of the lower hardness of Ag. Addn. of Ag showed no adverse effects on superconducting properties (J_c and T_c) of YBCO or BSCCO superconductors.

~30 Citings

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287. Minimum critical current density of 105 A/cm² at 77 K in the thin layer of Bi_{1.8}Pb_{0.4}Sr_{2.0}Ca_{2.2}Cu_{3.0}O_y superconductor near the Ag in Ag-sheathed tapes

By Lelovic, M.; Krishnaraj, P.; Eror, N. G.; Balachandran, U.

From [Physica C: Superconductivity \(Amsterdam\)](#) (1995), 242(3&4), 246-50. Language: English, Database: CAPLUS, DOI:10.1016/0921-4534(94)02441-3

The authors report for the 1st time a min. crit. c.d. in a BSCCO/Ag polycryst. sample of 1.1 × 10⁵ A/cm² at 77 K in a self-field. For practical applications of (Bi,Pb)₂Sr₂Ca₂Cu₃O_y (BSCCO-2223) high-temp. superconducting material, the crit. c.d. (J_c) is a limiting factor. A requirement for a J_c of 10⁵ A/cm² in long length wires and tapes, at 77 K and high magnetic field, was established. The transport J_c were measured on samples that retained a 10 μm thickness of the superconducting core after they were removed from rolled tapes. The thin superconducting layer region next to the Ag sheath is the actual current carrying region in the tape. These results confirm the presence of a high crit. c.d. region adjacent to the Ag in Ag-sheathed tapes, and provide a basis for further improvements in J_c. Regions of Ag also are present in the superconducting core.

~47 Citings

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288. Transport and magnetic properties of Sm-substituted BSCCO (2223) superconductors (Bi_{1.7}Pb_{0.3}Sr₂Ca₂-xSm_xCu₃O_y)

By Nanda Kishore, K.; Satyavathi, S.; Muralidhar, M.; Hari Babu, V.; Pena, O.

From [Physica C: Superconductivity \(Amsterdam\)](#) (1994), 235-240(Pt. 2), 1519-20. Language: English, Database: CAPLUS, DOI:10.1016/0921-4534(94)91984-4

The transport and magnetic properties of $\text{Bi}_{1.7}\text{Pb}_{0.3}\text{Sr}_2\text{Ca}_{2-x}\text{Sm}_x\text{Cu}_3\text{O}_y$ ($0 \leq x \leq 2.0$) have been studied. X-ray diffraction (XRD) suggests that the (2223) phase degrades with Sm substitution and the compds. with $x > 0.05$ show only the (2212) phase. The (2212) phase is maintained till $x = 2.0$. The d.c. resistivity and a.c. susceptibility measurements show that $T_{c \text{ onset}}$ and $T_c(0)$'s decrease with increasing Sm content. The results can be explained on the basis of granular supercond. The d.c. magnetization measurements performed on the compds. reveal that with increasing Sm concn., the superconducting vol., and the lower crit. field decrease. Thermoelec. power (TEP) measurements reveal that with increasing Sm content, the hole carrier concn. decreases. The XRD, d.c. resistivity, a.c. susceptibility, d.c. magnetization, and TEP results are presented and compared with earlier results on Gd- and Y-substituted BSCCO (2223) system.

~0 Citings

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289. Preparation and densification of HTc(2223) phase superconductor

By Tampieri, A.; Celotti, G.; Landi, E.; Babini, G. N.

From *Physica C: Superconductivity (Amsterdam)* (1994), 235-240(Pt. 1), 501-2. Language: English, Database: CAPLUS, DOI:10.1016/0921-4534(94)91474-5

BSCCO (2223) phase superconducting powder was synthesized by org. route: pyrolysis of citrates was used as alternative method to the solid state reaction. Powder with the nominal compn. $\text{Bi}_{1.84}\text{Pb}_{0.35}\text{Sr}_{1.9}\text{Ca}_{2.1}\text{Cu}_3\text{O}_x$ was synthesized in very short time: 24h including calcination and firing at 858° with various intermediate grinding steps. Reactions among components were studied by thermogravimetric and DTA. The identification of the reaction intermediates which play a crucial role in the synthetic process was systematically performed. Hot pressing was carried out to prep. highly dense superconducting materials and the densification behavior of the powders extensively studied.

~0 Citings

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290. Preparation of oxide superconductors and oxide superconductor articles thus obtained

By Riley, Gilbert N. Jr.; Otto, Alexander; Carter, William L.

From *PCT Int. Appl.* (1994), WO 9423459 A1 19941013, Language: English, Database: CAPLUS

A method for prepg. a BSCCO-2223 oxide superconducting article includes annealing an oxide superconductor article comprised of BSCCO-2223 oxide superconductor at a temp. selected from the range of $\sim 500^\circ \leq T \leq 787^\circ$ and an annealing atm. having an O pressure selected from within the region having a lower bound defined by the equation: $P_{\text{O}_2}(\text{lower}) \geq 3.5 \times 10^{10} \exp(-32,000/T + 273)$ and an upper bound defined by the equation: $P_{\text{O}_2}(\text{upper}) \leq 1.1 \times 10^{12} \exp(-32,000/T + 273)$. The article is annealed for a time sufficient to provide at least a 10% increase in crit. c.d. as compared to the crit. c.d. of the pre-anneal oxide superconductor article. An oxide superconductor $\text{Bi}_{2-y}\text{Pb}_y\text{Ca}_2\text{Cu}_3\text{O}_{10+x}$, where $0 \leq x \leq 1.5$ and where $0 \leq y \leq 0.6$ is obtained, characterized by a crit. transition temp. of > 111.0 K, as detd. by 4-point-probe method.

~3 Citings

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291. Magnetic field in the vicinity of BSCCO tapes carrying transport current

By Polak, M.; Majoros, M.; Kvitkovic, J.; Kottman, P.; Kovac, P.; Melisek, T.

From *Cryogenics* (1994), 34(ICEC Suppl.), 805-8. Language: English, Database: CAPLUS, DOI:10.1016/S0011-2275(05)80190-0

Measurements of magnetic field components B_x, B_y, B_z , produced by both shielding and transport currents in BSCCO/Ag tapes are presented. The measured sample BSCCO 2223 was prepd. by the powder in tube technique and the self field crit. current densities were of the order of 10^4 A/cm² at 77 K. The shielding currents were induced by the external magnetic field perpendicular to the tape surface. The sample magnetic field was measured using 3 Hall probes with small active area ($\sim 10^{-2}$ mm²) and sensitivity of the order of 10mV/T. They were fixed to a special holder so that they sense x,y and z component of the sample magnetic field at the distance ≥ 0.5 mm from the sample surface. The measured profiles provide information on the crit. c.d. inhomogeneities along the sample as well as on the spatial and time distribution of both transport and magnetization currents.

~12 Citings

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292. Magnetic characterization of pressed Ag-sheathed BSCCO (2223) tapes

By Calzona, V.; Cimberle, M. R.; Ferdeghini, C.; Fluekiger, R.; Grasso, G.; Marre, D.; Putti, M.; Rizzuto, C.; Siri, A. S.
From [Cryogenics \(1994\)](#), 34(ICEC Suppl.), 801-4. Language: English, Database: CAPLUS

Magnetization measurements were performed with a SQUID magnetometer on a pressed Ag-sheathed BSCCO (2223) tape. The hysteresis loops, analyzed in the framework of the Crit. State model show clear anomalies. The results are explained invoking granularity of the sample, as confirmed by the anal. of the reverse leg of the magnetization. The irreversibility line, measured in the orientations Bc and Bc, is also presented.

~2 Citings

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293. Mechanical properties of Bi-2223 tapes

By Gherardi, L.; Caracino, P.; Coletta, G.
From [Cryogenics \(1994\)](#), 34(ICEC Suppl.), 781-4. Language: English, Database: CAPLUS, DOI:10.1016/S0011-2275(05)80184-5

Fundamental requirements for tapes to be implemented in power transmission cables include flexibility, in addn. to current carrying capacity. As a matter of fact, better and better crit. current densities are being achieved on Bi₂Sr₂Ca₂Cu₃O_x (BSCCO-2223) tapes worldwide, and even though the best samples are still typically short and in many respects "exceptional", it seems that the gap between actual and target values for J_c is becoming promisingly smaller, and first applications closer. It is therefore essential that also the mech. performances of these intrinsically brittle composites are improved to meet the requirements imposed by manufg., handling and installation operations. In this work, the mech. behavior of 2223 BSCCO tapes prep'd. by the powder-in-tube method was systematically investigated. Stress-strain tensile tests at room temp. and at 77°K, bending tests, and crit. current vs. strain measurements were carried out on tapes with a pure Ag sheath. The results are discussed in terms of a semi-empirical model specifically developed, which takes into account also the thermo-mech. history of the samples.

~22 Citings

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294. Microstructural evolution of the BSCCO-2223 during powder-in-tube processing

By Briant, C. L.; Hall, E. L.; Lay, K. W.; Tkaczyk, J. E.
From [Journal of Materials Research \(1994\)](#), 9(11), 2789-808. Language: English, Database: CAPLUS, DOI:10.1557/JMR.1994.2789

The microstructural changes that occur when BSCCO (Bi-(Pb)-Sr-Ca-Cu-O) powder is processed by the powder-in-tube method were studied. The initial powder consisted of the 2212 phase plus second phases contg. Ca, Cu, Sr, and Pb. When the material was drawn, there was no alignment of the 2212 phase and the second phase particles remained large and blocky. Rolling induced a small amt. of alignment into the 2212 phase so that its c-axis was perpendicular to the rolling direction. Rolling also caused the second phase particles to become flatter. When these rolled samples were annealed at 828°C, the core sintered into a platelet structure, and there was an increase in the amt. of aligned material, particularly after annealing treatments of 16 and 32 h. After 8 h at 828°C, the 2212 variant of the superconducting phase began to transform to the 2223 variant. Pressing this structure improved the alignment, and annealing after pressing allowed further conversion of the 2212 phase to the 2223 phase and apparently removed the strains produced by the pressing. Repeated pressing improved the alignment and repeated annealing allowed more conversion of 2212 to 2223. Both the improved alignment, produced by pressing, and the transformation of 2212 to 2223, produced by the anneals, caused the superconducting properties of the material to improve.

~8 Citings

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295. The effect of sheath material and deformation method on the oxide core density, filament uniformity, and critical current density of (Bi,Pb)2Sr2Ca2Cu3Ox tapes

By Parrell, J. A.; Dorris, S. E.; Larbalestier, D. C.
From [Advances in Cryogenic Engineering \(1994\)](#), 40(Pt. A), 193-200. Language: English, Database: CAPLUS

Many variables control the crit. c.d. (J_c) in **BSCCO-2223** composites but not all of them are yet well understood, or even pos. identified. One important factor is reported to be the d. of the **BSCCO** filament, as measured by microhardness. Since different deformation processes may be used during fabrication, and each can have a different effect on the final **BSCCO** core d., the authors have made systematic studies of the microhardness, filament uniformity, and final J_c as a function of sheath hardness and whether the tape is rolled or pressed between heat treatments. Results show a strong correlation between the after-heat-treatment-microhardness and J_c . Rolled tapes never achieved the hardness of pressed tapes, and their J_c was correspondingly lower. The degree of transformation of the **BSCCO** powder to the **BSCCO-2223** phase was always lower in the rolled tapes than in the pressed tapes.

~20 Citings

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296. Recent issues in fabrication of high- T_c magnets and long-length multifilament conductors

By Balachandran, U.; Iyer, A. N.; Haldar, P.; Hoehn, J. G., Jr.; Motowidlo, L. R.; Galinski, G.

From *Applied Superconductivity* (1994), 2(3-4), 251-9. Language: English, Database: CAPLUS, DOI:10.1016/0964-1807(94)90011-6

A review with 31 refs. After fabricating long lengths (30-100 m) of Ag-clad Bi-**2223** tapes by the powder-in-tube process, the authors co-wound them into pancake-shaped coils by the wind-and-react approach. Test magnets were then fabricated by stacking and connecting the coils in series. The authors then characterized the magnets at the temps. of liq. helium (4.2 K), liq. neon (27 K), pumped liq. nitrogen (64 K), and liq. nitrogen (77 K) and in background fields of up to 12 T. A test magnet contg. 10 pancake coils generated magnetic fields ≤ 2.6 T at 4.2 K. Multifilament conductors of **BSCCO-2212** and **BSCCO-2223** also were fabricated. A **BSCCO-2212** multifilament conductor was fabricated with both pure silver and dispersion-strengthened silver (Ag- Al_2O_3) as the sheath materials. After final heat treatment, the yield strength of the Ag- Al_2O_3 matrix was twice that of the pure Ag matrix. At 4.2 K, crit. c.d. of the Ag- Al_2O_3 multifilament conductor approached 5×10^4 A/cm² at zero applied field and $> 2 \times 10^4$ A/cm² at 12 T. This paper addresses certain issues concerning high- T_c magnets and long-length multifilament conductors.

~20 Citings

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297. On the role of Vickers and Knoop microhardness as a guide to developing high critical current density Ag-clad **BSCCO-2223** tapes

By Parrell, J. A.; Dorris, S. E.; Larbalestier, D. C.

From *Physica C: Superconductivity (Amsterdam)* (1994), 231(1-2), 137-46. Language: English, Database: CAPLUS, DOI:10.1016/0921-4534(94)90153-8

Because there are many parameters influencing the crit. c.d. (J_c) of Ag sheathed (Bi,Pb)₂Sr₂Ca₂Cu₃O_x tapes, good and easily measured correlation variables to J_c are highly desirable. Yamada et al. have recently shown that very high J_c values can be obtained when the **BSCCO** core is rolled to a high Vickers microhardness (H_V) prior to heat treatment. The present expt. extends the correlation by showing that there is a linear relation between the H_V of reacted tapes and J_c . Measurement of the Knoop microhardness (H_K) shows that the hardness is highly anisotropic. H_K measured with the long indenter axis parallel to the a-b planes shows no dependence on reaction time or J_c , while H_K measured parallel to the c-axis is strongly correlated. A high microhardness appears to be directly correlated to a high-d. **BSCCO** core with a small crack d. Such a core has good connectivity which directly translates to a high J_c value.

~31 Citings

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298. Mechanical properties of pure and epoxy-modified (Bi,Pb)₂Sr₂Ca₂Cu₃O_{10+x} (**2223**) superconductors

By Low, I. M.; Wang, H.; Skala, R. D.

From *International Ceramic Monographs* (1994), 1(2, PROCEEDINGS OF THE INTERNATIONAL CERAMICS CONFERENCE, 1994), 1147-52. Language: English, Database: CAPLUS

The effect of incorporating epoxy resin into **BSCCO** (**2223**) superconductor by an infiltration process was investigated. Data for some common mech. properties for various composite compns. were compared with those for un-infiltrated matrix (pure **2223**). The addn. of epoxy led to substantial improvement in hardness, tensile strength, flexural modulus, flexural strength, impact toughness (G_{1c}), and fracture toughness (K_{1c}). The origins of these increases are discussed in terms of microstructure-property relationships.

~0 Citings

299. Are the grain boundaries the limiting factor in high-current conductors?

By Caplin, A. D.; Cassidy, S. M.; Cohen, L. F.; Cuthbert, M. N.; Lavery, J. R.; Perkins, G. K.; Dou, S. X.; Guo, Y. C.; Liu, H. K.

Edited By: Balachandran, U.; Collings, E. W.; Goyal, Amit

From [Process. Long Lengths Supercond., Proc. Symp. \(1994\)](#), 279-88. Language: English, Database: CAPLUS

A review with 22 refs. Detailed magnetic and elec. studies of high-current **BSCCO(2223)** and (2212) phase conductors show little indication of the grain-boundary "weak-link" behavior that occurs in polycryst. $\text{YBa}_2\text{Cu}_3\text{O}_7$. This conclusion is independent of whether a "brick-wall" model is invoked to describe the grain connectivity, and it is further bolstered by circumstantial evidence from irradiation experiments.

~0 Citings

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300. Measurements of AC losses due to transport currents in bismuth superconductors

By Ashworth, S. P.

From [Physica C: Superconductivity and Its Applications \(Amsterdam, Netherlands\) \(1994\)](#), 229(3-4), 355-60.

Language: English, Database: CAPLUS, DOI:10.1016/0921-4534(94)90518-5

Measurements of the losses of **BSCCO-2223** and **BSCCO-2212** tapes carrying a.c. transport currents are reported. Measurements were made at 77 K at frequencies in the range 20-60 Hz. The voltage waveforms generated by the a.c. transport are presented as well as the a.c. losses. For peak transport currents <90% of the d.c. critical current the losses of **BSCCO-2223** tapes are well described using an equation due to Norris [5] which assumes the presence of a critical state in the superconductor, and the power losses are proportional to the a.c. frequency (hysteresis losses). When the a.c. peak current approaches the d.c. critical current flux-creep effects dominate the losses, and the power losses cease to depend on frequency. In the **BSCCO-2212** sample flux-creep effects dominate at all currents. The examination of the voltage waveform generated in the **BSCCO-2223** sample shows both hysteretic and flux-creep generated voltages.

~25 Citings

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301. Dissipation mechanisms in Ag/BSCCO superconducting tapes

By Badia, A.; Huang, Y. B.; de la Fuente, G. F.; Rillo, C.; Navarro, R.

Edited By: Freyhardt, H. C

From [Appl. Supercond., \[Pap. Eur. Conf.\], 1st \(1993\)](#), 1, 717-20. Language: English, Database: CAPLUS

Isothermal $J_c(B)$ measurements at 4.2 K and 77 K have been performed on Ag-clad **BSCCO (2223)** rich tapes in order to establish dissipation systematics for each range. At 4.2 K and $B < 8$ T, low level thermal depinning is found, while dissipation is triggered by weak-link breaking as it is deduced from the critical current field dependence and the $V(I)$ functional behavior. On the other hand, the higher current part of these curves must be associated to silver magnetoresistance. Dissipation at 77 K is well described by thermally activated depinning of 2D vortices in the **BSCCO** crystallites. Only for the parallel orientation and $B < 0.1$ T limitations are of weak-link nature.

~1 Citing

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302. Anisotropic critical current densities of silver sheathed BSCCO-2223 tape

By Ashworth, S. P.; Glowacki, B. A.

From [Physica C: Superconductivity and Its Applications \(Amsterdam, Netherlands\) \(1994\)](#), 226(1-2), 159-64.

Language: English, Database: CAPLUS, DOI:10.1016/0921-4534(94)90491-X

A novel experimental arrangement is described in which current is constrained to flow perpendicular to the faces of $(\text{Bi, Pb})_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_x$ silver clad tape produced by the standard powder in tube technique. This configuration with "perpendicular" current flow shows that significant voltages are developed at current densities less than 1% of the conventional, longitudinal, critical current density. The effect of applied magnetic fields on the perpendicular critical current density are also reported, with fields perpendicular to the plane of the tape being most effective at reducing the critical current density. From this data it is calculated that the average critical current of each grain boundary is 0.5 mA and $<10 \mu\text{A}$ for the longitudinal and perpendicular flows respectively. This difference is attributed to the perpendicular current probing the whole of the superconductor core, while the longitudinal current may flow predominantly in a higher critical current density region near the silver sheath. Implications for the current distribution and critical current density measurement in short samples of **BSCCO-2223** tape are considered.

~6 Citings

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303. Fabrication of Bi-Sr-Ca-Cu-O superconducting thin films by RF magnetron sputtering

By Hong, Cheol Min; Park, Hyun Soo

From [Yoop Hakhoechi \(1994\), 31\(2\), 227-33](#). Language: Korean, Database: CAPLUS

The Bi-Sr-Ca-Cu-O thin films were deposited by RF-magnetron sputtering method on Si(P-111) wafer without a buffer layer and annealed at various temps. in oxygen atm. The temp. dependence of elec. resistance, the microstructure of intermediate phase, and the surface morphol. of films were examd. by four probe method, XRD, and SEM, resp. The chem. compn. and the depth profile of the films were detd. by ESCA spectra. Thin films annealed at 600° and 700° in oxygen atm. showed onset temps. of 90 K and 85 K, and T_c (zero) of 22 K and 31 K, resp. The sample annealed at 700° had the highest vol. fraction of superconducting phase and showed smooth microstructure. In ESCA spectra, the thin films were homogeneous with depth.

~0 Citings

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304. Methods of introducing lead into bismuth-2223 and their effects on phase development and superconducting properties

By Dorris, S. E.; Prorok, B. C.; Lanagan, M. T.; Browning, N. B.; Hagen, M. R.; Parrell, J. A.; Feng, Y.; Umezawa, A.; Larbalestier, D. C.

From [Physica C: Superconductivity and Its Applications \(Amsterdam, Netherlands\) \(1994\), 223\(1-2\), 163-72](#).

Language: English, Database: CAPLUS, DOI:10.1016/0921-4534(94)90709-9

The specific method of introducing Pb significantly influences the phase development and superconducting properties of Pb-doped Bi₂Sr₂Ca₂Cu₃O_x (**BSCCO-2223**) Ag-sheathed powder-in-tube tapes. This is demonstrated in a study of tapes made from a series of powder mixts. contg. the phases Bi_{1.8}Pb_{0.2}Sr₂CaCu₂O₈ (2212), Ca₂PbO₄, Ca₂CuO₃, and CuO, where the Pb content of 2212, z, was varied from 0.0 to 0.4. The overall compn. of each mixt. was the same, (Bi_{1.8}Pb_{0.4}Sr₂Ca₂Cu₃O₁₀), and the amts. of each phase were varied to compensate for changes in z. In an addnl. mixt. made from Pb-free 2212, Ca₂CuO₃, and CuO, all Pb was added as PbO. A significantly more complete **2223** formation, sharper transition temps., and higher crit. current densities were seen when all Pb was incorporated in the 2212 phase, rather than being added as either PbO or Ca₂PbO₄.

~43 Citings

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305. Preferred orientation of **BSCCO** via centrifugal slip casting

By Steinlage, Greg; Eoeder, Ryan; Trumble, Kevin; Bowman, Keith; Li, Shi; McElfresh, Mike

From [Journal of Materials Research \(1994\), 9\(4\), 833-6](#). Language: English, Database: CAPLUS,

DOI:10.1557/JMR.1994.0833

Due to the highly anisotropic properties of **BSCCO** superconductors, the bulk properties of these materials can be greatly affected by preferential orientation. Substantial c-axis orientation normal to the desired direction of current flow has been demonstrated by centrifugally slip casting lead-doped **BSCCO-2223**. The strong preferred orientation developed in the centrifugally slip-cast material demonstrates high crit. current potential.

~4 Citings

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306. Position-sensitive measurements of the local critical current density in Ag sheathed high-temperature superconductor (Bi,Pb)2Sr2Ca2Cu3Oy tapes. The importance of local micro- and macro-structure

By Larbalestier, D. C.; Cai, X. Y.; Feng, Y.; Edelman, H.; Umezawa, A.; Riley, G. N. Jr.; Carter, W. L.

From [Physica C: Superconductivity and Its Applications \(Amsterdam, Netherlands\) \(1994\), 221\(3-4\), 299-303](#).

Language: English, Database: CAPLUS, DOI:10.1016/0921-4534(94)90236-4

Small sections cut from within individual superconducting filaments of Ag sheathed $(\text{Bi,Pb})_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_y$ (BSCCO-2223) tapes have crit. current densities (J_c) which depend on the local microstructure and which can be ≤ 5 times higher than the av. J_c . Tapes having av. J_c values of 12-15,000 A/cm² (77 K, 0 T) had local $J_c \leq 76,000$ A/cm², a value larger than hitherto reported for any bulk sample. Close to the Ag sheath the conversion to the 2223 phase is more complete and the grains are larger and better aligned and the J_c is then much higher and less field sensitive. Large variations are found in more uniformly reacted tapes, perhaps due to variations of the local crack d. The microstructure of the highest J_c regions is still far from ideal, showing that the limits of this technol. important system are far from being achieved.

~90 Citings

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307. Further evidence that the critical current density of $(\text{Bi,Pb})_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_x$ silver-sheathed tapes is controlled by residual layers of $(\text{Bi,Pb})_2\text{Sr}_2\text{CaCu}_2\text{O}_y$ at (001) twist boundaries

By Umezawa, A.; Feng, Y.; Edelman, H. S.; Willis, T. C.; Parrell, J. A.; Larbalestier, D. C.; Riley, G. N. Jr.; Carter, W. L.
From *Physica C: Superconductivity and Its Applications* (Amsterdam, Netherlands) (1994), 219(3-4), 378-88.
Language: English, Database: CAPLUS, DOI:10.1016/0921-4534(94)90390-5

Field-dependent a.c. susceptibility measurements are correlated with the transport crit. c.d. (J_{ct}) and microstructure for some 20 Ag-clad $(\text{Bi,Pb})_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_x$ (2223) tapes having $J_{ct}(0\text{ T}, 77\text{ K})$ values ranging from 0-20000 A/cm². Fields of 0.1-1 mT induced a double transition in the real component of the susceptibility of all samples. The field dependence of the lower temp. transition ($T(H)$) exhibited a marked kink at 80 K and was always very sensitive to the applied field > 80 K, indicating an electromagnetically granular behavior. High-resoln. TEM revealed $(\text{Bi,Pb})_2\text{Sr}_2\text{CaCu}_2\text{O}_x$ (2212 phase) intergrowths at the numerous (001) twist grain boundaries. Samples with a high $J_{ct}(0\text{ T}, 77\text{ K})$ had only occasional half layers of 2212 at the (001) boundaries and required correspondingly higher fields to induce a kink in the $T(H)$ characteristic. The universal appearance of a kink at 80 K in all samples and the strong correlation of the field required to produce the kink to the zero-field, 77 K transport crit. c.d. strongly suggests that c-axis transport across (001) twist boundaries within grain colonies controls the crit. c.d., even in relatively high J_c BSCCO-2223 tapes.

~41 Citings

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308. Bismuth-rich bismuth-lead-strontium-calcium-copper-oxygen (2-2-2-3) superconducting tapes

By Kaufman, D. Y.; Lanagan, M. T.; Ballen, T. A.; Dorris, S. E.; Dawley, J. T.; Poeppel, R. B.
From *Materials Letters* (1993), 18(1-2), 1-4. Language: English, Database: CAPLUS, DOI:10.1016/0167-577X(93)90045-Y

The microstructural and elec. properties of Ag clad $\text{Bi}_y\text{Pb}_{0.4}\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_2$ ($y = 1.8, 2.0$ and 2.3) powder-in-tube tapes were investigated. The highest J_c values (2000 A/cm² at 77 K and 0 T) were obtained for tapes of powders $y = 1.8$ and 2.0 following a 150 h thermomech. routine at 855 °C. The presence of alk. earth second phases was not diminished by the addn. of bismuth. The phase equil. were obsd. to shift from 2-2-2-3 + $\text{Sr}_{14-x}\text{Ca}_x\text{Cu}_{24}\text{O}_{48}$ + $\text{Sr}_x\text{Ca}_{2-x}\text{CuO}_3$ to 2-2-2-3 + $\text{Sr}_x\text{Ca}_{2-x}\text{CuO}_3$ + CuO as the Bi content was increased from $y = 1.8$ to 2.0 . $(\text{Sr,Ca})_2\text{PbO}_4$ and 2-2-1-2 were present as byproduct phases at temps. above and below 855°C. Higher Bi content ($y = 2.3$) caused formation of the 2-2-1-2 phase as the 2-2-2-3 became Bi-satd.

~0 Citings

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309. Improvement of critical currents in bismuth-2223 bulk superconductors

By Eujen, R.; Brauer, D. J.; Huedepohl, J.
Edited By: Freyhardt, Herbert C.; Fluekiger, R.; Peuckert, M
From *High-Temp. Supercond. Proc. ICMC '90 Top.-Conf. Mater. Aspects High-Temp. Supercond.* (1991), 2, 1033-8.
Language: English, Database: CAPLUS

The authors have investigated the influence of various compns. and conditions on the formation of the BSCCO-2223 phase (T_c ca. 107 K), the crit. c.d. J_c , and the magnetic field dependence of the a.c. susceptibility.

~0 Citings

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310. 'Strong' grain boundaries in silver-bismuth strontium calcium copper oxide (2223) tapes

By Caplin, A. D.; Cassidy, S. M.; Cohen, L. F.; Cuthbert, M. N.; Lavery, J. R.; Perkins, G. K.; Dou, S. X.; Guo, Y. C.; Liu, H. K.; et al.
 From [Physica C: Superconductivity and Its Applications](#) (Amsterdam, Netherlands) (1993), 209(1-3), 167-70.
 Language: English, Database: CAPLUS

The remarkable improvement of the superconducting properties of polycryst. **BSCCO(2223)** when processed into Ag-clad tapes was studied magnetically. Two factors contribute to the excellent tape performance: over the studied range of field and temp., the grain boundaries show no evidence of being weak-links. Also, intragranular flux pinning is much stronger than might be expected from single crystal data, and appears to det. the tape crit. current.

~8 Citings

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311. Nonlinear pressure dependence of the transport critical current density in **BSCCO-2223** tapes

By Bud'ko, S. L.; Tao, Y. K.; Wang, Y. Q.; Chu, C. w.; Hor, P. H.
 From [Solid State Communications](#) (1993), 86(7), 441-5. Language: English, Database: CAPLUS, DOI:10.1016/0038-1098(93)90462-V

The transport crit. c.d. (J_c) in Bi-**2223** tapes with $J_c(77\text{ K}) \sim 10^4\text{ A/cm}^2$ was studied under hydrostatic pressure up to 14 kbar. The pressure dependence of the crit. c.d. in Bi-**2223** tapes is qual. different from that in YBCO ceramics and thin films. In Bi-**2223** tapes, J_c increases in the initial pressure range with pressure derivs. $d(\ln J_c)/dP$ in the range 0.06-0.1 kbar⁻¹. At $P \sim 8$ -12 kbar, $J_c(P)$ turns to satn., while the superconducting transition temp. increases linearly under pressure with $dT_c/dP \sim 0.16$ -0.19 K/kbar over the entire pressure range.

~5 Citings

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312. A **BSCCO(2223)** thin film DC SQUID utilizing natural grain boundary weak-links

By Mueller, F. J.; Gallop, J. C.; Caplin, A. D.; Labdi, S.; Raffy, H.
 From [Journal of Alloys and Compounds](#) (1993), 195(1-2), 703-6. Language: English, Database: CAPLUS, DOI:10.1016/0925-8388(93)90834-A

A low-noise thin-film **BSCCO(2223)** SQUID device operating at $\geq 77\text{ K}$ was described. The natural grain boundary weak links combine with a highly textured film structure to allow noise levels comparable to those achieved in YBCO or TBCCO devices.

~0 Citings

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313. High critical currents in Ag-**BSCCO(2223)** tapes: Are the grain boundaries really 'weak-links'?

By Cassidy, S. M.; Cohen, L. F.; Cuthbert, M. N.; Lavery, J. R.; Perkins, G. K.; Caplin, A. D.; Dou, S. X.; Guo, Y. C.; Liu, H. K.; et al.
 From [Journal of Alloys and Compounds](#) (1993), 195(1-2), 503-6. Language: English, Database: CAPLUS, DOI:10.1016/0925-8388(93)90787-N

The remarkable improvement of the superconducting properties of polycryst. **BSCCO(2223)** when processed into Ag-clad tapes has been investigated with magnetization measurements. The tape bulk crit. c.d. has been compared directly with the intergrain crit. current of the cryst. powder extd. from the tapes. The results show that two factors contribute to the excellent tape performance: intragranular flux pinning is much stronger than might be expected from single crystal data, and the grain boundaries display no evidence of being "weak-links".

~1 Citing

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314. Influence of thermomechanical treatment on critical currents in silver-sheathed bismuth strontium calcium copper oxide-**2223** tapes

By Brauer, D. J.; Busch, D.; Eujen, R.; Gladun, A.; Huedepohl, J.
 From [Cryogenics](#) (1992), 32(11), 1052-5. Language: English, Database: CAPLUS, DOI:10.1016/0011-2275(92)90026-7

BSCCO-2223 tapes have been produced by the 'powder-in-tube' method with reproducible crit. current densities of $>1 \times 10^4$ A cm⁻² at 77 K and 5×10^4 A cm⁻² at 4.2 K. Supercond. at 77 K was retained in fields of up to 7 T. The influence of mech. treatment (e.g. drawing, rolling, and pressing) as well as that of different annealing processes has been investigated. In addn. to the detn. of crit. currents, a.c. shielding measurements have been used to verify the quality of intergrain contacts. The temp. dependence of j_c between 4.2 and 80 K has been studied while the field (H_c ; H_c with H or I) was varied from 0 to 8 T.

~5 Citings

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315. Unusual form of the temperature and field dependence of the grain boundary weak-link dissipation in silver-sheathed bismuth strontium calcium copper oxide (2223) tapes

By Cassidy, S. M.; Cohen, L. F.; Cuthbert, M. N.; Dou, S. X.; Caplin, A. D.

From *Cryogenics* (1992), 32(11), 1034-7. Language: English, Database: CAPLUS, DOI:10.1016/0011-2275(92)90022-3

The impressive crit. current performance of Ag-sheathed **BSCCO** (2223) tapes at low temps. and high fields implies that in them the grain boundary weak links are much less deleterious than in other bulk high-temp. superconducting materials. However, so far there is little understanding of how the improvement comes about. The authors have looked at the weak-link behavior in these tapes by examg. the form of the I-V characteristics at currents above crit. In contrast to bulk YBCO, textured or not, and to **BSCCO** thin films, the weak-link dissipation in Ag-sheathed **BSCCO** tapes drops rapidly as the temp. decreases, consistent with the large increase in crit. current. Thus, the microscopic nature of the boundaries in these tapes is fundamentally different from that in the other materials.

~1 Citing

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316. Development of elements of a high T_c superconducting cable

By Lay, K. W.

From *Report* (1990), (Order No. AD-A233 270), 7 pp.. Language: English, Database: CAPLUS

The realigned program is aimed at the development of long lengths of silver-clad **BSCCO**. A variation on the powder in tube technique will be used to make silver-clad **BSCCO** tapes. **BSCCO-2223** is the material of choice with 20K the operating temp. goal. Such a tape conductor ultimately could be used in a coil for a magnet, motor or generator. A key element of the program is the development of processes with the potential of fabrication of very long conductors. A novel process for making silver clad tapes (SCT) is under study. In this process extruded **BSCCO** is wrapped with silver foil which is then pressure welded. This technique has the potential for fabrication of continuous lengths and also avoids the extensive size redn. and attending potential for non-homogeneity involved with the more conventional powder-in-tube (PIT) process. A parallel PIT study is also underway to use for comparison purposes and as a back-up process to the SCT process.

~0 Citings

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