TT 1.7 Fr 11:45 TU H104

Superconductivity in nanocrystalline mechanically alloyed MgB_2 bulk samples and Fe sheathed multifilamentary tapes — ●OLAF PERNER[1], WOLFGANG HÄSSLER[1], CLAUS FISCHER[1], MARKO HERRMANN[1], GÜNTER FUCHS[1], KONSTANTIN NENKOV[1], BERNHARD HOLZAPFEL[1], LUDWIG SCHULTZ[1], and JÜRGEN ECKERT[2] — [1]Leibniz-Institut für Festkörper- und Werkstofforschung Dresden, PF 270116, D-01171 Dresden — [2]TU Darmstadt, Petersenstr. 23, D-64287 Darmstadt

The application of the mechanical alloying (MA) technique for MgB_2 powder preparation can be regarded as an optimal tool to obtain a nanocrystalline microstructure due to grain refinement as well as to control the exact stoichiometry of the MgB_2 compound. Subsequently hot pressed bulk samples as well as by the powder-in-tube technique fabricated tapes show enhanced magnetic flux pinning in the superconducting state resulting in high critical current density J_c values.

In order to investigate the role of grain boundaries and impurities on superconductivity in MgB_2 a series of bulk samples with different preparation parameters as well as impurity doping with oxides were characterized by transport and magnetization measurements as well as analytical transmission electron microscopy. The results will be described in detail and compared with the model of vortex dynamics.

The multifilamentary MgB_2 tapes exhibit high values of the critical current density J_c of 35 kA/cm^2 and 9 kA/cm^2 in external magnetic fields of 7.5 T and 10 T, respectively, at 4.2 K due to a homogeneous, nanocrystalline microstructure and small sized impurities.

TT 1.8 Fr 12:00 TU H104

In-situ RHEED-Charakterisierung und elektrische Eigenschaften von $YBa_2Cu_3O_7$-Schichten — ●A. HIRSCH, M. KARGER, F. LUDWIG und M. SCHILLING — Institut für Elektrische Messtechnik und Grundlagen der Elektrotechnik, TU-Braunschweig, Hans-Sommer-Str. 66, D-38106 Braunschweig

Zur Herstellung von Bauelementen aus Hochtemperatursupraleitern wie Josephson-Kontakte und supraleitende Quanteninterferometer (SQUIDs) sind dünne Schichten hoher epitaktischer Qualität erforderlich.

Mit den Methoden der statistischen Versuchsplanung wird das Wachstum von $YBa_2Cu_3O_7$ auf $SrTiO_3$-Einkristallsubstraten mittels gepulster Laser-Deposition (PLD) in Hinblick auf die strukturellen und elektrischen Eigenschaften untersucht. Insbesondere wird ein Zusammenhang zwischen den aus in-situ RHEED-Untersuchungen gewonnenen epitaktischen Eigenschaften der Schichten und den elektrischen Eigenschaften Übergangstemperatur T_c, kritische Stromdichte j_c bei 77 K und relativen Widerstandsverhältnis R(300 K)/R(100 K) geprüft. Desweiteren wird der Einfluss von kontinuierlicher bzw. Intervall-Deposition auf die Schichtqualität diskutiert. Ein Überblick über die Ergebnisse wird gegeben.

TT 1.9 Fr 12:15 TU H104

J_c enhancement in $YBa_2Cu_3O_{7-x}$ thin films by metal doping — ●J. HÄNISCH, C. CAI, R. HÜHNE, B. HOLZAPFEL und L. SCHULTZ — IFW Dresden, Helmholtzstraße 20, 01069 Dresden

Due to the sharp cube textures in RABiTS (rolling assisted biaxially textured substrates) tapes, grain boundaries are not the only J_c limiting

factor anymore and flux pinning is now again a focus for further improvement of coated conductors in higher magnetic fields.

In this work, we present a comparative study of the influence of different metallic dopants (D: Ir, Ti, Zr and Hf) on $J_c(B)$. Quasi-multilayer films of 40x(6.5 uc YBCO/n uc D) were prepared by pulsed laser deposition with a stoichiometric YBCO target and a metal target for the dopant, n being in the range of 0.04...0.3. In the case of Ir, nano-particles of $BaIrO_3$ are growing epitaxially inside the YBCO film. Due to their larger lattice parameter of 4.1 Å compared to 3.9 Å (b-axis) in YBCO, the YBCO structure is under lateral stress. A certain degree of disorder on the Ba sites is expected because of the non-stoichiometry after precipitation. Both introduce extended and random defects respectively and lead to an enhancement in pinning force density and irreversibility field.

In addition, Zn doping is investigated as a possibility to enhance J_c in thin films. At doping levels of x < 0.05%, an increase in J_c in higher magnetic fields was found.

TT 1.10 Fr 12:30 TU H104

Cube textured Cu-based substrates for HTS coated conductors — ●RAINER NAST, BERNHARD OBST, GUNTER KOTZYBA, and WILFRIED GOLDACKER — Forschungszentrum Karlsruhe, Institut für Technische Physik, Postfach 3640, 76021 Karlsruhe

As alternative substrate tapes for coated conductor, cube textured copper based tapes instead of nickel are possible candidates to achieve high critical current densities in YBCO. The advantages of Cu are the non-ferromagnetism, the larger thermal and electrical conductivity and the lower cost of Cu in comparison to Ni. In this work, we report about the texturing of pure copper and different copper alloys, such as Cu-Sn, Cu-Mn and a dispersion hardened Cu-B4C tape. The annealing temperature have been optimized to get a high volume fraction of the cube texture as sharp as possible. The maximum of the cube texture deviation histograms is at 3.8° for Cu and 4.4° for Cu-B4C. In addition a continuous Ni overlayer was plated on Cu to avoid the diffusion of Cu and to improve the oxidation resistance for the following growth of buffer layers and YBCO.

TT 1.11 Fr 12:45 TU H104

Normal and mixed state Hall effect in $(Hg_{0.9}Re_{0.1})Ba_2CaCu_2O_{6+\delta}$ fully textured HTSC thin films — ●ABOUELWAFA SALEM, GERHARD JAKOB, and HERMANN ADRIAN — Institut für Physik, Johannes Gutenberg-Universität, 55099

Temperature and magnetic field dependence of the Hall effect in the normal and mixed state of fully textured $(Hg_{0.9}Re_{0.1})Ba_2CaCu_2O_{6+\delta}$ (HgRe-1212) HTSC thin films prepared by laser ablation deposition have been studied. The longitudinal resistivity ρ_{xx} and Hall resistivity ρ_{yx} of HgRe-1212 superconductor thin films were measured for a wide range of magnetic fields up to 12 T with the field perpendicular to the ab plane and the current in the ab plane. A sign change of the Hall resistivity is observed in fields below 3 T in the region close to the superconducting onset temperature. The temperature dependencies $\rho_{xx} \propto T$ and $\rho_{yx} \propto 1/T$ have been observed for HgRe-1212 thin films. Anderson's formula for the Hall angle θ_H, namely cot $\theta_H = \alpha T^2 + \beta$, remains valid for temperatures T above T_c. In the mixed state a power-law behavior is observed, where ρ_{yx} scales to a power-law function of ρ_{xx}: $\rho_{yx} = A\rho_{xx}^\beta$, with β increasing from 1.0 to 1.7 as the field increases from 1 to 12 T.

TT 2 Correlated Electrons - Metal Insulator Transition

Zeit: Freitag 10:15–13:00   Raum: TU H2053

TT 2.1 Fr 10:15 TU H2053

The orbital degree of freedom in single- and bilayered manganites — ●M. MERZ[1], P. REUTLER[2], B. BÜCHNER[2], A. REVCOLEVSCHI[3], Y. IDZERDA[4], S. TOKUMITSU[5], and S. SCHUPPLER[5] — [1]Inst. für Kristallographie, RWTH-Aachen — [2]IFW Dresden — [3]Uni. Paris-Sud — [4]NRL, Washington — [5]Forschungszentrum Karlsruhe, IFP

Transition metal oxides like the manganites are fascinating materials since their physical properties are intimately connected with an unusual interrelation between spin, charge, and orbital degrees of freedom. Yet, only little is known about the nature of the experimentally observed ordered phases and the principal factors determining the ordering scheme. To better understand the phenomena of charge/orbital ordering (CO/OO) and to isolate the fundamental properties which serve as a driving force for CO/OO we have investigated layered manganites with

x-ray diffraction and near-edge x-ray absorption spectroscopy. The current data demonstrate that the energy difference between $d_{3x^2-r^2}$, $d_{3y^2-r^2}$, and $d_{3z^2-r^2}$ orbitals is very small for single- *and* bilayered systems and indicate that the orbital degree of freedom is determined not only by crystal field effects but also by orbital coupling.

TT 2.2 Fr 10:30 TU H2053

Local Green's operator and its applications to manganites — ●HORACIO ALIAGA — Theo. III, Uni-Augsburg, D-86135 Augsburg, Germany

An algorithm is presented to calculate the electronic local Green's operator for manganites-related hamiltonians. This algorithm is proved to scale linearly with the number of states in the Hilbert-space, is able of parallel implementation, and outperforms computationally the Exact Di-