TT 10: Superconductivity: Fabrication and Characterization

Time: Monday 14:00–15:00
Location: H 3010

MOCVD and MOD process for Coated Conductors — ●OLIVER STADED1, RUSLAN MOYDINOV2, JÜRGEN SCHMIDT1, HARTMUT KREUM1, GEORG WAIL1, GÜNTHER KOTTLEVA1, ANNETE WELK2, RAUER NASS2, ALEXANDRA JUNGH2, WILFRIED GOLDFACHER2, SERGEI SAMOILENKO3, OLEG GORBENKO5, and ANDREI KAUF5 = TU Braunschweig, IOT, Bierenroder Weg 53, 38108 Braunschweig — 2Forschungszentrum Karlsruhe, ITP, Hermann von Helmholtz Platz 1, 76344 Eggenstein-Leopoldshafen = Moscow State University V234, Department of Chemistry, Moscow 119 899 = PerCoTeCh AG, Bierenroder Weg 53, 38176 Braunschweig

A MOCVD and a MOD process for continuous deposition of oxide buffer layers and YBCO at once on long metal tapes was developed. Textured Ni(W) tapes were coated with oxide buffer layers at low oxygen partial pressure without oxidation of the metal tape. YBCO films of 350-1000 nm thick were obtained using tape velocity of 4 m/h. MOCVD and MOD buffer layers, which were delivered from partners of the Virtual Institute, were covered by YBCO. Entirely obtained by MOCVD superconductive samples revealed a critical current density of 1MA/cm² at 77 K. The excellent in plane texture (FWHM = 1.4-3°) at out of plane texture (FWHM = 5-6°) of YBCO films may enable to increase the critical current density further. YBCO deposited on MOD obtained buffer layers reached the maximum critical current density 4MA/cm².

Acknowledgement - The authors thank the partners of the Virtual Institute Chemically deposited YBCO Superconductors.

Roebel Assembled Coated Conductor Cables (RACC): Ac-Losses and Application Potential — ●CURT SCHMIDT and WILFRIED GOLDFACHER — Forschungszentrum Karlsruhe, Institut für Technische Physik

High temperature superconducting (HTS) cables for transport currents well above 1 kA, assembled from a number of tapes, are required for application in transformers, generators and for future fusion reactor coils. Coated conductor (CC) tapes are suitable candidates for an operation temperature between 50 and 77 K which is a crucial precondition for economical cooling costs. Ac-field applications require low ac-loss cables and hence transposition of the individual tapes. The in the plane inflexibility of the tapes doesn’t allow classical twisting techniques. The problem can be solved using a modified Roebel technique where meander shaped tapes are assembled to a Roebel cable. The electrical connection between the tapes, necessary to allow current redistribution, and the mechanical stability is achieved by impregnation with a conductive epoxy resin. We prepared short lengths of cables with 11 and 12 structured tapes and measured ac-losses in an external ac field and coupling current time constants. In the interesting frequency range below 100 Hz the coupling losses are small compared to hysteresis losses in the tape. The possibility of hysterensis loss reduction by striating the tapes should therefore be taken into consideration. Finally we discuss the potential of this cable type with respect to ac-losses and current carrying capability as a function of operation temperature, as well as possible routes of long length cable fabrication.

TT 11: Superconductivity: Tunneling, Josephson Junctions, SQUIDs

Time: Monday 15:15–18:00
Location: H 3010

Invited Talk

Superconducting Quantum Interference Filters — ●NILS SCHOFHOFER, Institut für Theoretische Physik der Universität Tübingen

Basic principles of Josephson junction based interferometer arrays are reviewed. Key features of parallel and also serial Superconducting Quantum Interference Filters (SQIFs) are explained in detail. It is shown that SQIF interferometers can be engineered to have a specific voltage output pattern vs. magnetic field that is well suited for applications in magnetometry and also microwave sensors.

Tailored Josephson phase: φ, π and φ−π SIFS Josephson junctions — ●MARVIN WEIDES1, ALIXEN BANNYUK2, UTHRAYASANKAR PERALAGU1, JUDITH PFEIFFER1, MATTHIAS KEMMLER2, DIETER KOELLE2, REINHOLD KLEINER2, and EDWARD GOOLDEN2 — 1Institute for Solid State Research, Research Centre Jülich — 2Physikalisches Institut - Experimentalphysik II

In superconducting/ferromagnet (S/P) systems the superconducting wave function extends into the ferromagnet with a damped oscillatory behavior. This results in novel and interesting physics, such as the possibility to realize a π Josephson junction (JJ) - a JJ with the phase drop of π in the ground state. Recently, we fabricated Nb/Al2O3/NiCu/Nb JJs with uniform as well as step-like ferromag-