ac field were measured as a function of frequency and field amplitude in transverse and parallel field orientations as well as the coupling current time constant in transverse field. The potential of this cable type for ac-use is discussed with respect to ac-losses and current carrying capability.

15 min. break

TT 12.4 Tue 10:45 H20

Limitation of fault current in power grids using YBCO coated conductors — •Wolfgang Schmidt[1], Hans-Peter Krämer[1], Heinz-Werner Neumüller[1], Urs Schoop[2], Alex Malozemoff[2], and Alex Otto[2] — [1]Siemens AG, Corporate Technology, Erlangen, Deutschland — [2]American Superconductor Corporation, Westborough (MS), USA

Resistive type superconducting fault current limiters (FCL) utilize a current-driven transition from the superconducting state to the normal state to limit short circuit currents in electric power grids. The FCL needs not triggering and recovers automatically after the short circuit has been opened. The technical performance of superconducting fault current limiters has been demonstrated within numerous successful projects worldwide. Since the advent of commercial second generation (2G) high temperature superconductor wires based on YBCO thin films, also the economic feasibility comes into reach. We have investigated the fault current limiting performance of 344 superconductors stabilized with stainless steel sheets supplied by American Superconductor Corporation within a co-operation with Siemens Corporate Technology. Bifilar coils have been manufactured and tested with a typical limitation period of 50 ms under stepwise increasing voltage loads to determine the maximum temperature the wires can withstand without degradation. Several coils have been assembled into a limiter model to demonstrate uniform tripping of the individual coils and fast recovery with few seconds. Test results of single coils and of the coil assembly are presented and further developments will be discussed.

TT 12.5 Tue 11:00 H20

Switching and Quench Propagation in Coated Conductors for Fault Current Limiters — •Helmut Kinder[1], Jörg Handke[1], Werner Prusseit[1], Andrej Kudymow[2], Christian Schacherer[2], and Mathias Noe[2] — [1]THEVA Dünnschichttechnik GmbH, Ismaning — [2]ITP, Forschungszentrum Karlsruhe

We address the use of coated conductors for resistive fault current limiters. Fast quench propagation is essential to let the conductor switch on the full length within milliseconds. The ordinary thermal quench propagation mechanism, however, is too slow because of the small heat diffusivity in typical tape substrate materials. Here we present a new mechanism involving a propagating instability of the superconductor made possible by the particular conductor design. The instability is based on current bunching leading to overcritical current densities and does not rely upon thermal conductivity. It leads to a rapid spreading of the resistive state so that the conductor develops its full normal resistance in a millisecond. Thus the conductor protects itself without the need of thick normal conducting stabilizers that would reduce the current limiting efficiency. The mechanism was confirmed by numerical simulations and by experiments on samples of short and medium length. Conductor lengths of 1 m and more switched homogeneously exhibiting voltage drops of up to 2.7 V/cm.

TT 12.6 Tue 11:15 H20

Nexans Advances in all CSD Route for REBCO Coated Conductors — Joachim Bock, Juergen Ehrenberg, Bernhard Hoppe, Dirk Isfort, Marcel Klein, and •Mark Rikel — Nexans SuperConductors, Chemiepark Knapsack, Huerth 50351, Germany

Development of REBCO coated conductors (CC) at Nexans SuperConductors (NSC) is focused on all chemical solution deposition (CSD) route that promises the best performance-to-price ratio in long lengths. The feasibility of all CSD approach is shown on the lab scale: using metalorganic deposition (MOD), NSC was able to produce YBCO/CeO_2/LZO/NiW CCs with J_c(77 K, sf) = 0.5 MA/cm^2. The major advance of NSC on a semi-industrial scale is the use of MOD route for production of high-quality $La_2Zr_2O_7$ (LZO) coated NiW RABITS in lengths up to 12 m. With those substrates, it is possible to produce CCs with the simplest (one-buffer) architecture by depositing REBCO using other techniques (ISD at Theva, Ismaning; MOCVD at IOT, Braunschweig; HLPE at University of Cambridge, UK). The best short sample I_c = 280, 120 and 100 A/cm-width for HLPE, ISD, and MOCVD, respectively First long-length conductors show transport I_c = 40 A (10m-long, ISD). Further work is focused on optimisation of the already established mixed (MOD+PVD) approaches, understanding optimum architecture and processing conditions for the all-CSD route and developing tools for scaling those conditions to long-length production.

The work is supported in part by BMBF (SupraNanoSol, ForOxid) and EU (HiperChem, Super3C).

TT 12.7 Tue 11:30 H20

Temperature series to study the biaxial texturing of $La_2Zr_2O_7$ buffer layers on nickel-tungsten substrates — •Leopoldo Molina[1], Sebastian Engel[2], Bernhard Holzapfel[2], and Oliver Eibl[1] — [1]Institute of Applied Physics, University of Tübingen, Auf der Morgenstelle 10, D-72076, Tübingen, Germany — [2]IFW Dresden, P.O.Box 270116, D-01171 Dresden, Germany

$La_2Zr_2O_7$(LZO) buffer layers are currently of great interest for $YBa_2Cu_3O_{7-x}$(YBCO) coated conductor technology. The mechanism of biaxial texturing of the film was investigated by varying the annealing temperature. The LZO buffer layers were prepared by chemical solution deposition (CSD) and annealed at temperatures ranging from 600°C to 1000°C in order to study the growth, biaxial-texture and microstructure of the LZO thin films. Nanovoids of 10-50 nm were found to be a typical feature of the buffer layers. Samples were investigated by transmission electron microscopy (TEM) and x-ray diffraction (XRD). Diffraction contrast imaging and convergent beam electron diffraction (CBED) techniques were used to investigate the microstructure of the films in plan-view and cross-section. XRD measurements showed that LZO grain growth starts at T>800°C. The average Ni grain size of the biaxially textured nickel tungsten substrates is 40μm and the grain size of the LZO buffer layers is 100-200 nm. Thus, even though the films are highly biaxially textured, no epitaxial growth occurs.

15 min. break

TT 12.8 Tue 12:00 H20

The pyrolysis of $YBa_2Cu_3O_{7-\delta}$ thin films produced by metal-organic deposition using trifluoroacetic acid-based precursors — •Thomas Thersleff[1], Sebastian Engel[1], Martina Falter[1], Brigitte Schlobach[1], Kerstin Knoth[1], Ludwig Schultz[1,2], and Bernhard Holzapfel[1] — [1]Leibniz IFW-Dresden, Postfach 270116, 01171 Dresden, Germany — [2]Dresden University of Technology, Department of Physics, D-01062 Dresden, Germany

To assist with the optimization of the TFA-MOD process for $YBa_2Cu_3O_{7-\delta}$ coated conductor development, this work examines the pyrolysis stage - in which organic constituents are burned off - on both single crystal as well as buffered nickel substrates. Samples were dip-coated into precursor solutions prepared using metal acetates as well as $YBa_2Cu_3O_{7-\delta}$ powder dissolved in trifluoroacetic acid and placed in a flowing gas furnace with a humid O_2 atmosphere. While firing, individual samples were quenched at various temperatures, effectively freezing the pyrolysis development. These samples were then analyzed for phase formation using grazing incidence x-ray diffraction; surface morphology using AFM; decomposition reactions using TGA, DTA, and exhaust gas characterization; and stoichiometry using EDX. Additionally, cross-sectional cuts were made in the pyrolyzed layers with a FIB, facilitating a detailed discussion of the layer morphology. Results indicate that significant layer shrinkage occurs between 200 and 250 °C and reveal a large surface tension. BaF_2 crystallizes above 270 °C while CuO forms above 200 °C. FIB results suggest that HF gas evolves above 200 °C but is trapped within the layer until 270 °C.

TT 12.9 Tue 12:15 H20

Artificial pinning centers in $YBa_2Cu_3O_{7-x}$ thin films created by nanoparticles from the gas phase — •Maria Sparing, Elke Backen, Thomas Freudenberg, Jörg Acker, Ruben Hühne, Ludwig Schultz, Bernd Rellinghaus, and Bernhard Holzapfel — IFW Dresden, P.O. Box 270116, D-01171 Dresden, Germany

The critical current density in $YBa_2Cu_3O_{7-x}$ (YBCO) thin films, which limits their application in high magnetic fields, can be enhanced by the introduction of artificial pinning centers as, e.g., provided by nanoparticles. An inert gas phase condensation process was used to prepare Y_2O_3 nanoparticles from an yttrium target by DC magnetron sputtering. With this method, both the size distribution and the areal density of the particles as determined from TEM investigations are