

Critical current anisotropy of GdBCO tapes grown on ISD-MgO substrate

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The critical current anisotropy of a GdBCO coated conductor grown on a Hastelloy substrate with MgO buffer layer deposited by inclined substrate deposition (ISD) technique will be presented. As a result of the tilted growth of the MgO buffer layer, the c-axis of the superconducting layer is tilted 66° with respect to the tape surface. J_c -anisotropy is measured by using the four probe method in a two-axis goniometer. Bridges were patterned for transverse and longitudinal current directions. The set-up allows measurements under maximum Lorentz force (MLF) and variable Lorentz force (VLF). MLF measurements on the longitudinal bridge show the expected peaks corresponding to the tilted ab-plane and defects perpendicular to the surface of the tape. The shift of the peaks in VLF measurements can be explained by the resulting angle between the ab-plane and magnetic field. Measurements in the transverse current direction indicate vortex channeling up to a temperature as high as 77 K in both in-plane and out-of-plane scans. Vortex channeling disappears at high temperatures and low fields. The asymmetries observed in the angular dependence of J_c for both MLF and VLF measurements will be related to the tilted and meandering grain boundaries and their complex interplay with vortices at certain directions of magnetic field.

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