

Grain and Grain Boundary Inductive Critical Current Densities of YBCO Coated Conductors

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YBCO coated conductors have emerged as a promising material for superconducting power applications. Due to a granular microstructure and the strong dependence of critical current density J_c on grain misorientations, the transport current in these conductors flows in a percolative way through the network of grain boundaries. Therefore, J_c can be limited by two different mechanisms: vortex pinning associated with the intra-grain critical current density and percolative issues associated with the inter-grain network. We have studied the interaction between these two critical current densities and the dependence of both on fundamental parameters such as the YBCO thickness and the average grain size, as well as effects from modifications induced by mechanical deformation of the tapes. This study has been performed with our new methodology based on dc-magnetization measurements, which enables us to analyse in a non destructive way the intra-grain and grain boundary critical current densities simultaneously.