Abstracts

Absorption at High Microwave Power by Large-Area TI-Based Superconducting Films on Metallic Substrates

D.W. Cooke, P.N. Arendt, E.R. Gray and A.M. Portis. "Absorption at High Microwave Power by Large-Area TI-Based Superconducting Films on Metallic Substrates." 1991 Transactions on Microwave Theory and Techniques 39.9 (Sep. 1991 [T-MTT] (Special Issue on Microwave Applications of Superconductivity)): 1539-1544.

Microwave surface resistance measurements have been made on large-area Tl-Ba-Ca-Cu-O thick films that are magnetron-sputtered onto oriented Ag alloy substrates by replacing the end wall of an 18 GHz TE/sub 011/ mode Cu cavity with the superconducting film. The best surface resistance values obtained are 4 and 14 m Omega at 10 K and 77 K, respectively; corresponding Cu values are 8 m Omega and 21 m Omega. The dependence of the surface resistance on microwave power was measured in a similar way except that a Nb cavity was used instead of a Cu cavity. Typically, the surface resistance of the film begins to rise in 1-10 Oe of microwave field and saturates in 20-60 Oe. A model is presented relating the observed saturation to critical penetration of Josephson junctions. Films exhibiting the highest degree of c-axis texturing show the weakest dependence of surface resistance on power and also exhibit the sharpest transition to the superconducting state as measured at high frequency. These results are important for the development of high-power microwave cavities.

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