Abstracts

Laterally resolved microwave surface-resistance measurement of high-T/sub c/ superconductor samples by cavity substitution technique

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Microwave surface impedance measurement of a high-temperature superconductor (HTS) is a sensitive probe to test its quality, particularly if a microwave device is to be fabricated. Most microwave characterization employs resonance techniques in which the components of the surface impedance are extracted from the measured Q value and the shift in the resonance frequency. In this paper, we present a modification of the widely used complete end-plate substitution technique to measure the surface resistance of samples having dimensions smaller than the dimension of the end plate at 20 GHz, as well as to facilitate the laterally resolved surface resistance measurement of large-area HTS samples. From the knowledge of the electromagnetic-field configuration in a TE/sub 011/-mode cylindrical cavity, the loss contribution from the HTS sample is analyzed theoretically and measured experimentally in the temperature range of 20-100 K. The design of the cavity is discussed to optimize the sensitivity of the measurement by the placement of the sample and to maximize the difference in the measured Q value.

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