

Abstracts

Stripline Resonator Measurements of Z_s Versus H_{rf} in $YBa_2Cu_3O_{7-x}$ Thin Films

D.E. Oates, A.C. Anderson, D.M. Sheen and S.M. Ali. "Stripline Resonator Measurements of Z_s Versus H_{rf} in $YBa_2Cu_3O_{7-x}$ Thin Films." 1991 Transactions on Microwave Theory and Techniques 39.9 (Sep. 1991 [T-MTT] (Special Issue on Microwave Applications of Superconductivity)): 1522-1529.

We report measurements of the surface impedance, Z_s , of $YBa_2Cu_3O_{7-x}$ thin films using a stripline resonator. The films were deposited on $LaAlO_3$ substrates by off-axis magnetron sputtering. We obtained Z_s as a function of frequency from 1.5 to 20 GHz, as a function of temperature from 4 K to the transition temperature (~ 90 K), and as a function of the RF magnetic field from zero to 300 Oe. At low temperatures the surface resistance, R_s , of the films shows a very weak dependence on the magnetic field up to 225 to 250 Oe. At 77 K, R_s is proportional to the square of the field. The penetration depth shows a much weaker dependence on the field than does R_s . At 1.5 GHz the surface resistance of the best films is $2 \times 10^{-6} \Omega$ at 4 K and $8 \times 10^{-6} \Omega$ at 77 K. We also discuss the origins of the magnetic field dependence of Z_s .

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