Abstracts

Dielectric Properties of Single Crystals of Al/sub 2/O/sub 3/, LaAlO/sub 3/, NdGaO/sub 3/, SrTiO/sub 3/, and MgO at Cryogenic Temperatures

J. Krupka, R.G. Geyer, M. Kuhn and J.H. Hinken. "Dielectric Properties of Single Crystals of Al/sub 2/O/sub 3/, LaAlO/sub 3/, NdGaO/sub 3/, SrTiO/sub 3/, and MgO at Cryogenic Temperatures." 1994 Transactions on Microwave Theory and Techniques 42.10 (Oct. 1994 [T-MTT]): 1886-1890.

A dielectric resonator technique has been used for measurements of the permittivity and dielectric loss tangent of single-crystal dielectric substrates in the temperature range 20-300 K at microwave frequencies. Application of superconducting films made it possible to determine dielectric loss tangents of about 5 x 10/sup -7/ at 20 K. Two permittivity tensor components for uniaxially anisotropic samples were measured. Generally, single-crystal samples made of the same material by different manufacturers or by different processes have significantly different losses, although they have essentially the same permittivities. The permittivity of one crystalline ferroelectric substrate, SrTiO/sub 3/, strongly depends on temperature. This temperature dependence can affect the performance of ferroelectric thin-film microwave devices, such as electronically tunable phase shifters, mixers, delay lines and filters.

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