

Microwave Dielectric Properties of Lanthanum Aluminate Ceramics and Single Crystal

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Far infrared reflectivity spectra for single crystals and ceramics of LaAlO_3 were measured and eigenfrequencies and damping constants of transverse and longitudinal optical modes were evaluated in order to discuss variations in the dielectric properties in the single crystal and ceramics. The single crystal and the ceramics were prepared by a Czochralski method and conventional solid phase reaction using high purity reagents respectively. The observed reflectivity spectra were fitted by 4 IR active modes predicted by factor group analysis in order to evaluate the vibration eigenfrequencies and damping constants. It was found that difference in dielectric loss between two kinds of single crystals, which have the different crystal orientation along with an central axis in the cylindrical shape crystals. It was inferred that the difference in dielectric loss was due to that in cut off frequency of the single crystals. The loss obtained from the IR reflectivity of the ceramics was used to evaluate the extrinsic loss in the ceramics.