

Microwave Surface Impedance and Nonlinear Properties of MgB₂ Films

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We present the results of the temperature dependence of the microwave surface impedance and the nonlinear properties of high-quality MgB₂ films on c-cut sapphire at temperatures below 40 K. MgB₂ films with the surface resistance (R_s) as low as 0.09 milli-Ohms at 8 K at 19.6 GHz were prepared ex-situ by annealing a boron layer in magnesium-rich environment. The nonlinear properties of the MgB₂ films were investigated by measurements of higher order harmonics in patterned MgB₂ coplanar waveguide devices. Effects of surface ion-milling on the nonlinear properties of MgB₂ films are also studied. The nonlinear response is compared with that of epitaxially grown YBCO films. Applicability of MgB₂ films for microwave passive devices is discussed.

keywords : MgB₂, surface impedance, nonlinear