

Effects of Wet-chemical Etching and Ion-milling on the Microwave Surface Resistance of $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ Films

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Realization of a high critical current density (J_c) on the order of 10^6 A/cm² at 77 K for long thick, high-temperature superconductor (HTS)-coated conductors enabled to use the coated conductors for large-scale applications. However, depth profile studies on thick HTS films revealed degradation of J_c as the film thickness increased, for which wet-chemical etching or ion-milling were used to reduce the film thickness. We studied effects of wet-chemical etching and ion-milling on the intrinsic surface resistance of YBCO films grown on LaAlO_3 substrates. Wet-chemicals such as Br_2 -MeOH and EDTA were used as the etchants.

The intrinsic surface resistance of the YBCO films were measured by using a dielectric resonator method at temperatures of 7 – 88 K and the resonant frequency of ~8.5GHz, which allowed studies on the effects of the wet-chemical etching and ion-milling within the measurement error of ~5%. Discussion follows.

keywords : etchant, film thickness, microwave surface resistance, YBCO film, dielectric resonator, Br_2 -MeOH, EDTA, Ion-milling