Growth of Large-area YBa2Cu3Oy filmsand Application on Superconducting microwave devices

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ABSTRACT

The double-sided high-Tc superconducting (HTS) YBa2Cu3Oy (YBCO) films were grown on LaAlO3 (LAO) substrates by an off-axis magnetron sputtering system with two 2-inch sputtering guns. High-quality YBCO films within a f 50 mm diameter area were obtained. The homogeneous YBCO films revealed transition temperature Tc(R=0) of ? 86 K and a critical current density Jc (zero field) of ~ 1.5 ? 106 A/cm2 at 77 K. The surface impedance of YBCO films was measured using a probe-coupling type microstripline resonator method. The surface resistance Rs of ~ 4.7 mW was obtained at 77 K and 2240 MHz. Furthermore, narrow-band microstrip hairpin-type filters are designed and fabricated. Our 3-pole filter has the insertion loss of 0.28 — 1.35 dB with a bandwidth of 10 MHz at 1.94 GHz, while the 6-pole filter has the insertion loss of 0.223 — 1.7 dB with a bandwidth of 20 MHz at 1.94 GHz. The results are discussed.

Keywords : high-Tc superconducting film ; HTS ; magnetron sputtering ; probe-coupling type microstripline resonator ; microstrip hairpin-type filter

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