

Magnetic Field Behavior of Submicron Sized Intrinsic Josephson Junctions Using $\text{Bi}_2\text{Sr}_2\text{Ca}_1\text{Cu}_2\text{O}_{8+\delta}$ Whiskers

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We have studied the superconducting properties of intrinsic Josephson junctions(IJJ) fabricated by the Focused Ion Beam(FIB) etching method on a $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ whiskers grown by the tellurium-doped precursors. Lateral dimensions of the stacks are from $0.3 \times 0.4 \mu\text{m}^2$ up to $2.0 \times 2.0 \mu\text{m}^2$ and each stacks have 10-20 junctions. We obtained typical critical current density J_C as $3000 \sim 5000 \text{ A/cm}^2$ in the zero magnetic field and dependence of critical current in the external magnetic fields which are applied parallel to the CuO plane. We observed the angular dependence of the critical currents on the applied magnetic fields on the junctions, which could be explained by the d-wave order parameter symmetry. We also discussed heating effect due to quasi-particle injections in the submicron scale IJJ.

Keywords : Intrinsic Josephson Junction(IJJ), whisker