

Stacks of $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+x}$ Intrinsic Josephson Junctions Fabricated by Double-side-cleaving Technique

Myung-Ho Bae and Hu-Jong Lee

Department of Physics, University of Science and Technology, Pohang, Korea

We studied the fluxon-flow characteristics in stacks of long and narrow intrinsic Josephson junctions fabricated with $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+x}$ single crystals employing the double-side-cleaving technique. A stack of junctions, sandwiched between two metallic electrodes on both sides of the stack, was typically 20 μm long, 2 μm wide, and 30~50 nm thick, thus was in a long-junction limit and contained just a few tens of intrinsic Josephson junctions. This technique enabled one to remove the “basal stack” located underneath the mesa structure of intrinsic Josephson junctions of interest. The presence of the basal stack, by strong inter-junction coupling of Josephson fluxons both in the mesa and the basal stack, may significantly distort the fluxon-flow characteristics in the mesa itself. This technique allows one to isolate the mesa structure or a stack of intrinsic junctions, with boundary conditions closer to those of most of the theoretical analyses and with more uniform injection of the bias current. We will present the fabrication method using the double-side-cleaving technique and the preliminary data of fluxon-flow characteristics obtained from the stacks with the basal stack removed.

keywords : Double-side-cleaving technique; stack of intrinsic Josephson junctions; Josephson fluxon dynamics