

Fabrication and Characterization of Short Josephson Junctions with Stepped Ferromagnetic Barrier

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Abstract—We present novel low- T_c superconductor-insulator-ferromagnet-superconductor (SIFS) Josephson junctions with planar and stepped ferromagnetic interlayer. We optimized the fabrication process to set a step in the ferromagnetic layer thickness. Depending on the thickness of the ferromagnetic layer the ground state of the SIFS junction has a phase drop of either 0 or π . So-called 0- π Josephson junctions, in which 0 and π ground states compete with each other, were obtained. These stepped junctions may have a double degenerate ground state, corresponding to a vortex of supercurrent circulating clock- or counterclockwise and creating a magnetic flux which carries a fraction of the magnetic flux quantum Φ_0 . Here, we limit the presentation to static properties of short junctions.

Manuscript received January 3, 2008; accepted January 17, 2008. Reference No. ST27; Category 4.