

Novel Nonequilibrium Microwave Emission and Subgap Structure in Current-voltage Characteristic of $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+d}$ Intrinsic Josephson Junction Mesa

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We have measured the transport properties of $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+d}$ (BSCCO) intrinsic Josephson junction mesa. The transport measurement with current flow along the c-axis, perpendicular to the layer of mesa showed the subgap structures on the current-voltage characteristic. For the single intrinsic junctions, the microwave radiation appears as three different modes of oscillations; Josephson emission, nonequilibrium broad emission and sharp coherent microwave emission. The mutual phase interactions between two-mesa structures of BSCCO intrinsic Josephson junctions were studied. The results were interpreted by the Josephson plasma excitation model due to quasiparticle injection.

keywords : BSCCO, intrinsic junction, Josephson plasma oscillation, nonequilibrium state.