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IN VB-2

Submicron Stacked-junction Fabrication from $Bi_2Sr_2CaCu_2O_{8+\delta}$ Whiskers by Focused-ion-beam (FIB) Etching

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We fabricated submicron-sized intrinsic Josephson junctions (IJJ) by the focused-ion-beam (FIB) etching method. The principal result was a reduction of the in-plane junction area to 0.3 μm^2 by direct FIB etching with no degradation in the critical transition temperature (T_c). In the current (I)- voltage (V) characteristics of these stacks, the gap structure and the normal state resistance are clearly observed together with a reduction of the Joule heating and disappearance of the branch structure. The Coulomb staircase structure was found in the I-V curves of submicron junctions as a result of their small effective capacitance of fF order.

keywords : intrinsic Josephson junction, focused-ion-beam, in-plane junction area, submicron junctions