

Influence of ramp shape and morphology on the properties of $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ -ramp-type junctions

C. Horstmann, P. Leinenbach, A. Engelhardt, R. Gerber, J. L. Jia, R. Dittmann, U. Memmert, U. Hartmann and A. I. Braginski

The correlation between the shape and the morphology of ramps prepared by ion-beam etching of $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ thin films, and the properties of ramp-type junctions were investigated in detail. We examined the influence of different fabrication parameters on the $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ ramps by atomic force microscopy. Ramp-type junctions were fabricated using $\text{PrBa}_2\text{Cu}_{2.9}\text{Ga}_{0.1}\text{O}_{7-\delta}$ as barrier material. We observed a strong influence of the shape of the ramp on the homogeneity and, thus, on the transport properties of the junctions. Furthermore, we observed that the roughness of the ramps is strongly influenced by the voltage of the ion-beam during etching. Best results are achieved when an additional wet cleaning step by bromine solution in ethanol is introduced prior to the deposition of the barrier and the top electrode. As a result from our optimization, the on-chip spread of the junction critical current was reduced to 11%.