

Ion-beam sputter deposition process for $Y_1Ba_2Cu_3O_{7-\delta}$ thin-film structures

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Ion-beam sputter deposition (IBS) has been developed to a fully oxygen-compatible technology for growth of complex oxides, such as $Y_1Ba_2Cu_3O_{7-\delta}$ (YBCO) thin films. The IBS system consists of an rf-plasma ion source with molybdenum grids for sputtering, a dc-plasma electron source for space charge compensation, stoichiometric YBCO and NGO targets, a beam chopper with BaO_2 , Cu, and Nd blades for stoichiometry control, and an ECR-oxygen-plasma source for *in situ* film oxidation and photoresist removal. Due to its complexity the IBS process is fully computer-controlled. A salient feature of IBS is the excellent crystallographic and morphological properties of thin (100)/(010)- and (103)-oriented YBCO films on $SrTiO_3$ (STO) and $NdGaO_3$ (NGO) substrates. Sharp interfaces and good superconducting properties render this technology feasible for the fabrication of SIS-ramp-junction SQUID's.

Keywords: Physical vapor deposition (PVD); Superconductors; Thin film

Materials: $YBa_2Cu_3O_{7-x}$

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