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Fabrication and characterization of $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ Aharonov-Bohm rings and ultra-long nanowires PAICHIA KUO, JESSIE SHIUE, Institute of Physics, Academia Sinica, Taiwan, PATRICK MORALES, J.Y.T. WEI, Dept. of Physics, University of Toronto, Canada — We report a novel technique to fabricate $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ (YBCO) nanodevices with characteristic length scale smaller than the YBCO penetration depth. The nanodevices presented here are Aharonov-Bohm rings $\sim 1.5 \mu\text{m}$ in diameter, and 200 nm nanowires $\sim 300 \mu\text{m}$ in length. These devices have T_c behaviors similar to that of unpatterned YBCO thin films. Fabrication of nanostructured complex oxide is a challenge even with advanced thin film growth techniques since either chemical or physical etching tends to compromise the film properties. The effective method is to epitaxially deposit thin film onto nano-patterned oxide substrate without any post-deposition treatment. Our novel technique takes advantage of the 3D micromachining capability of focused-ion-beam to nano-pattern the oxide substrate without the inherent surface damage and edge rounding problems caused by the energetic ion beam. This method is a reliable way to fabricate nanostructures of complex oxides and hence enables the studies of their properties.

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