Abstract Submitted
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Magnetic Oxide nanoparticles D. RUZMETOV, Y. SEO, V. CHANDRASEKHAR, Physics and Astronomy, Northwestern University, L.J. BELENKY, D.M. KIM, C.B. EOM, Materials Science and Engineering, University of Wisconsin Madison, X. KE, M.S. RZCHOWSKI, Physics, University of Wisconsin Madison — We have fabricated nanopillar arrays of epitaxial magnetic oxide thin films and heterostructures consisted of $SrRuO_3$, $La_{0.67}Sr_{0.33}MnO_3$ and insulating barrier. The films were grown on TiO_2 surface terminated (001) $SrTiO_3$ substrates with atomic layer control by pulsed laser deposition with in situ high pressure RHEED, and were patterned into nanopillars using e-beam lithography and neutralized Ar ion milling with Ti and Au as milling mask materials. Scanning electron and atomic force microscopy measurements confirmed that we have produced well defined diameter 100 nm and 40 nm tall pillar arrays, which are, to our knowledge, the smallest pillars made from magnetic perovskite oxides. The LSMO pillars whose dimensions are smaller than the domain size (∼150nm) and comparable to the exchange length (∼50nm) are ferromagnetic at room temperature as shown by magnetic force microscopy. Using multilevel e-beam lithography we made single nano-ellipses from LSMO and SRO and wired them individually with Au leads. We performed electron transport measurements at 5K aiming to measure anisotropic magnetoresistance and coercive fields of single nano-ellipses ranging in size from 850 x 400 nm^2 to 400 x 150nm^2. Supported by NSF-ECS 0210449.

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