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Strain effects on the magnetic properties of epitaxial $SrRuO_3$ thin films CHANGKUN XIE, JOSEPH BUDNICK, BARRETT WELLS, Department of Physics, University of Connecticut, Storrs, CT 06269-3046, DEPARTMENT OF PHYSICS, UNIVERSITY OF CONNECTICUT, STORRS, CT 06269-3046 TEAM
— We study the effects of lattice strain on the magnetic behavior of epitaxial $SrRuO_3$ thin films grown by pulsed laser deposition. Most films have been grown on $SrTiO_3$ and $KTaO_3$ substrates that provide compressive and tensile strain, respectively. The Curie temperature (Tc) is reduced compared to the corresponding bulk for compressively strained $SrRuO_3$ films. This is consistent with previous results. Tc is enhanced an almost equal amount for films under tension. The transition temperature shows a fairly large change between the films with different types of strain (compressive and tensile), but further variation of strain produces only small changes in Tc. The rise in Tc with tensile strain is unique as far as we know. We present the temperature-strain phase diagram of $SrRuO_3$ thin films and discuss possible mechanisms for the strain dependent changes in magnetic properties. This work is supported through NSF DMR-0239667. Some data was taken at the National Synchrotron Light Source, Brookhaven National Laboratory, which is supported by the U.S. Department of Energy, Division of Materials Sciences and Division of Chemical Sciences, under Contract No. DE-AC02-98CH10886.

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