Abstract Submitted
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Strong Pressure Dependence of Electrical Transport in V_2O_3 Thin Films[1] ILYA VALMIANSKI, GABRIEL RAMIREZ, SIMING WANG, Department of Physics and Center for Advanced Nanoscience, University of California San Diego, XAVIER BATLLE, Department of Fundamental Physics and Institute of Nanoscience and Nanotechnology, University of Barcelona, IVAN K. SCHULLER, Department of Physics and Center for Advanced Nanoscience, University of California San Diego — We present results of electrical transport measurements in V_2O_3 thin films under hydrostatic pressure from 100 KPa to 1.6 GPa. Uniaxial pressure and strain dependences of the metal-insulator transition temperature in V_2O_3 were extracted using a method previously established for high Tc superconductors [1]. Strain in the z direction was calculated using V_2O_3 stiffness along the growth direction, while lateral strain was determined by the substrate properties. V_2O_3 thin films (100 nm) were grown epitaxially on three differently oriented single crystal Al_2O_3 substrates (a-plane, m-plane, and r-plane). Crystal phase purity and film quality were confirmed using high angle X-ray diffraction and X-ray reflectometry. All of the films showed a more than a four order of magnitude resistance change between the metallic and insulating states. The obtained pressure and strain dependences of the transition temperature may lead to novel device applications.

[1] S Bud'ko, J. Guimpel, O. Nakamura, M. Maple and I. K. Schuller, Phys. Rev. B, 1992, 46 1257

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Ilya Valmianski
Univ of California - San Diego

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