

Abstract Submitted  
for the MAR05 Meeting of  
The American Physical Society

**Comparative study of ferromagnetism in dilutely Cr, V, Co and Fe doped TiO<sub>2</sub> films**<sup>1</sup> I. SATOH, S. ZHANG, S. R. SHINDE, S. DHAR, M. S. R. RAO, D. C. KUNDALIYA, S. B. OGALE, T. VENKATESAN, Center for Superconductivity Research, Dept. of Physics, Univ. of Maryland, College Park, S. LOFLAND, Dept. of Physics and Astronomy, Rowan Univ. Glassboro, NJ — Epitaxial thin films of TiO<sub>2</sub> dilutely doped with Cr, V, Co and Fe are grown on LaAlO<sub>3</sub> (LAO) and sapphire substrates under different growth conditions. The films on LAO are anatase while those on sapphire are rutile. Occurrence of ferromagnetism, the magnetic moment, temperature dependence of magnetization, and concentration dependence of the saturation moment and coercive field are examined for Cr, V and Fe doped films, and compared with the well studied case of Co:TiO<sub>2</sub>. Various techniques such as x-ray diffraction, SQUID magnetometry, vibrating sample magnetometry, and Rutherford backscattering channeling are used. The magnetic moment appears in the Cr doped anatase TiO<sub>2</sub> grown at 850 °C at oxygen pressure of 10<sup>-5</sup> Torr, but the film is insulating in nature. No moment is seen in the conducting film grown at lower temperature of 700 °C. The growth condition and concentration dependence in this and other systems exhibit interesting features, which are analyzed in terms of the new models of ferromagnetism involving the role of defects and polaronic states.

<sup>1</sup>Supported by DARPA SpinS and NSF DMR 00-80008

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Date submitted: 16 Dec 2004

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