Abstract Submitted
for the TSS07 Meeting of
The American Physical Society

Are the surfaces of CrO_2 half-metallic? C.A. VENTRICE, JR., Texas State Univ., D.R. BORST, Univ. of New Orleans, H. GEISLER, Texas State Univ., J. VAN EK, Seagate Technologies, Y.B. LOSOVYJ, Louisiana State Univ., P.S. ROBBERT, Univ. of New Orleans, U. DIEBOLD, Tulane Univ., J.A. RODRIGUEZ, Brookhaven National Lab, G.X. MIAO, A. GUPTA, Univ. of Alabama — Previous photoelectron spectroscopy studies of CrO_2 have found either no density of states or a very low density of states at the Fermi level, suggesting that CrO_2 is a semiconductor or a semimetal. This is in contradiction to calculations that predict that CrO_2 should be a half-metallic ferromagnet. Recently, techniques have been developed to grow high-quality epitaxial films of CrO_2 on TiO_2 substrates by chemical vapor deposition. We present photoelectron spectroscopy measurements of epitaxial $CrO_2(110)/TiO_2(110)$ and $CrO_2(100)/TiO_2(100)$ grown using a CrO_3 precursor. In addition, measurements of epitaxial $Cr_2O_3(0001)/Pt(111)$ films grown by thermal evaporation of Cr in an oxygen atmosphere are presented as a reference for reduced CrO_2 films. The measurements of the CrO_2 surfaces show no emission at the Fermi level after sputtering and annealing the surfaces in oxygen, even though our soft core photoemission data and low energy electron diffraction measurements provide evidence that stoichiometric CrO_2 is present. The consequence of this is that neither surface of CrO_2 is metallic. This behaviour could result from a metal to semiconductor transition at the (110) and (100) surfaces.

Carl Ventrice, Jr.
Texas State University

Date submitted: 26 Feb 2007 Electronic form version 1.4