

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Are the surfaces of CrO₂ metallic? A photoelectron spectroscopy study of epitaxial CrO₂(100) and CrO₂(110) films C. A. VENTRICE, JR., Texas State Univ., D. R. BORST, Univ. of New Orleans, H. GEISLER, Texas State Univ., G. X. MIAO, A. GUPTA, Univ. of Alabama — Previous photoelectron spectroscopy studies of CrO₂ have found either no density of states or a very low density of states at the Fermi level, suggesting that CrO₂ is a semiconductor or a semimetal. This is in contradiction to calculations that predict that CrO₂ should be a half-metallic ferromagnet. We present photoelectron spectroscopy measurements of epitaxial CrO₂(110)/TiO₂(110) and CrO₂(100)/TiO₂(100) grown using a CrO₃ precursor. In addition, measurements of epitaxial Cr₂O₃(0001)/Pt(111) films grown by thermal evaporation of Cr in an oxygen atmosphere are presented as a reference for reduced CrO₂ films. The measurements of the CrO₂ 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 CrO₂ is present. The consequence of this is that neither surface of CrO₂ is metallic. This behaviour could result from a metal to semiconductor transition at the (110) and (100) surfaces.

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Date submitted: 20 Nov 2006

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