

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Fabrication and properties of TiO₂ cluster films XIAOHUI WEI, Y.F XU, Z SUN, RALPH SKOMSKI, D.J SELLMYER, Department of Physics and Astronomy and Nebraska Center for Materials and Nanoscience, University of Nebraska — Recently much interest has been directed toward nanostructured pure and doped semiconductors for their interesting dielectric, optical and magnetic properties and potential applications in spintronic devices. In this study a gas-condensation cluster-deposition system was used to make cluster-assembled films. Ti and TiO₂ targets were used to prepare Ti and TiO₂ cluster assembled films. The Ti and TiO₂ clusters were examined by TEM to determine their size and size distribution. Films were scanned by AFM to see their surface morphology and examined by XRD to see their structural evolution with annealing temperature and annealing time. TEM revealed that the sizes of the Ti and TiO₂ clusters are 9 and 20 nm respectively. After annealing at 400 °C for an hour in oxygen, the Ti cluster films transform into pure polycrystalline rutile, which has a high dielectric constant, whereas the TiO₂ cluster films remain a mixture of anatase and some rutile even after 900°C annealing. The optical, magnetic and dielectric properties of the films will also be discussed. This work is sponsored by NSF-MRSEC, ONR and NCMN.

Wei Xiaohui
Aps member

Date submitted: 20 Nov 2006

Electronic form version 1.4