Abstract Submitted
for the PSF11 Meeting of
The American Physical Society

Electrical Transport Anomalies in Nanometer Scale Manganese Films ERIK WOLTER, University of Northern Iowa, TIM KIDD, ANDREW STOLLENWERK, AARON O'SHEA, University of Northern Iowa — Nanoscale structures have been studied for several decades, and they are used in applications such as solar cells, superconductors, and other devices in science and industry. Nanostructures have been defined to be materials with at least one dimension less than 100 nm. The properties are being studied and modified to make products faster, smaller, and more efficient. Manganese nanothilms were grown by thermal evaporation and resistance was measured *in situ.* During the first stages of growth, the resistivity has an exponential dependence on thickness. This is consistent with Mn forming disconnected islands rather than a continuous film at low coverage. After the film reaches a critical thickness, the islands coalesce and the data can then be fitted with Fuchs' equation. The resistivity continues to decrease but the minimum resistivity of the film does not reach bulk resistivity because of the high density of defects in the film. AFM analysis verified that rougher films occur at faster growth rates and inhibit the continuity of thin films. Therefore a slow growth rate is important for growing smooth continuous films at nano sizes.

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Date submitted: 29 Sep 2011 Electronic form version 1.4