Abstract Submitted
for the NWS05 Meeting of
The American Physical Society

Thermoelectric Power in the Transparent Conductive Oxide (TCO) $CuSc_{1-x}Mg_xO_{2+y}$ DARA L. EASLEY, ALLEN L. WASSERMAN, Oregon State University — In the final process of fabricating the p-type thin film transparent conductive oxide (TCO) $CuSc_{1-x}Mg_xO_{2+y}$, the material is exposed to oxygen under varying pressures. This step intercalates oxygen into the lattice structure, which has the effect of introducing acceptor-like impurities (holes). In order to extract more information about this material a thermodynamic theory is applied to recently measured Seebeck coefficients. The theory assumes that intercalated oxygen introduces holes that thermally migrate to copper sites, providing the system with transport carriers that respond to the influence of electric fields and/or temperature gradients. The calculated Seebeck coefficient is a function of temperature, an intercalated atom concentration for the material and a concentration dependent hole activation energy. When used to fit the Seebeck data it yields an intercalated oxygen concentration dependence which corresponds well with a simple Langmuir model of surface adsorption of oxygen under pressure, thereby providing an independent context for interpreting and validating the model parameters extracted from the Seebeck measurements.

Dara L. Easley
Oregon State University

Date submitted: 11 Apr 2005 Electronic form version 1.4