Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Experimental and Theoretical Studies of Thermoelectric Properties of Manganese (IV) Oxide Particles as a Function of Electrical Resistance MORGAN HEDDEN, NICHOLAS FRANCIS, JASON HARALDSEN, COSTEL CONSTANTIN, James Madison University — Thermoelectric (TE) materials show great promise for converting waste heat energy into electricity. TE systems have many unique advantages such as silent operation, time reliability, and dimensional scalability. Recently, researchers have found that MnO_2 nanoparticles show a giant Seebeck coefficient of S = 20 mV/K, which is 100 times higher than that of bismuth telluride-one of the best TE materials. However, no figure-of-merit measurements (ZT) have been reported so far. In this project, we present preliminary results of ZT, Seebeck coefficient, thermal and electrical conductivities as a function of particle electrical resistance in the range of 10-80 Ω for particle sizes in the range of 5 nm – 150 μm. ZT values ranged between 0.12-0.18. The samples with the smallest particle size show the greatest promise for further increasing the ZT. For comparison to experiment, we also present density functional theory results for conductance and other transport properties.

Costel Constantin
James Madison University

Date submitted: 15 Nov 2013 Electronic form version 1.4