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Seebeck Coefficient of Manganese Oxide Nanoparticles as a Function of Ohmic Resistance[1] NICHOLAS FRANCIS, MORGAN HEDDEN, COSTEL CONSTANTIN, James Madison University — Due to the ever increasing energy demand and growing global concern over the environmental impact of CO_2 emissions, there is an urging need to seek solutions to transit from fossil fuels to sustainable energy. Thermoelectric (TE) materials show great promise for converting waste heat energy into electricity. TE systems have many unique advantages such as silent operationality, time reliability, and dimensional scalability. Most recently, researchers Song et al. [1] found that MnO_2 nanoparticles show a giant Seebeck coefficient of S = 20 mV/K, which is100 times higher than bismuth telluride, one of the best TE materials. Song et al.[1] concluded the paper claiming that the giant S is related to the surface density of the electronic states (DOS). However, they provided very little information about the S as a function of Ohmic resistance [R] for different nano particle sizes which can give information about the DOS. Our preliminary results show that there is a sudden increase of S from 0.33-0.63 mV/K as R increases from 80-110 Ohms. This transition has never been seen before and it can give clues as to the existence of the Giant S observed in this material.

[1] F. Song, L. Wu and S. Liang, Giant Seebeck coefficient thermoelectric device of MnO_2 powder, Nano. 23, 085401 (2012).

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