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The Origin of Enhanced High Temperature Electron Transport in Thermoelectric $Ca_3Co_4O_9$ TAO WU, TREVOR A. TYSON, HAIYAN CHEN, New Jersey Institute of Technology, JIANMING BAI, Oak Ridge National Laboratory, CHERNO JAYE, National Institute of Standards and Technology — Temperature dependent measurements of resistivity, crystal structure and heat capacity reveal significant hysteresis occurring near 400 K in $Ca_3Co_4O_9$. The largest changes in structure occur in the CoO_2 layer associated with electron transport: manifested mainly by b_2 axis changes. Application of magnetic fields up to 8 T reduces the area of the resistivity hysteresis loop with saturation at $\sim$4 T. Reduced resistivity associated with this first order phase transition from metallic to semiconducting behavior enhances the thermoelectric properties at high temperatures and points to the metal-insulator transition as a mechanism for improved ZT in high temperature thermoelectric oxide. This work is supported by DOE Grant DE-FG02-07ER46402. The Physical Properties Measurements System was acquired under NSF MRI Grant DMR-0923032 (ARRA award).

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