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The Effect of Sintering on the Thermoelectric Properties of Chemically Synthesized Nano-Bulk $\text{Bi}_{2-x}\text{Sb}_x\text{Te}_3$ J.S. DYCK, S. DORROH, Physics Dept., John Carroll University, B.D. MAO, J.W. WANG, C. BURDA, Chemistry Dept., Case Western Reserve University — Considerable research effort has gone into improving the performance of traditional thermoelectric (TE) materials such as $\text{Bi}_{2-x}\text{Sb}_x\text{Te}_3$ through a variety of nanostructuring approaches. Bottom-up, chemical approaches have the potential of producing very small nanoparticles (< 50 nm) with narrow size distributions and controlled shape. For this study, nanocrystalline powder of $\text{Bi}_{2-x}\text{Sb}_x\text{Te}_3$ with $x = 0 - 1.5$ has been synthesized using a ligand- assisted chemical method, and consolidated into bulk pellets with cold pressing followed by sintering. These materials have the interesting property that a wide range of carrier concentrations are accessible through different Bi/Sb ratios, with low values of x being n-type and higher values becoming p-type. In this work, we present the thermoelectric transport measurements from 6 – 300 K as a function of sintering temperature, and a beneficial effect is found. The samples are also characterized by Hall effect, XRD, and compositional analysis. We will present results on the structure-property relations, and discuss strategies for optimization of this class of TE materials for high performance.

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