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Optimizing Thermoelectric Properties in Composites MICHAEL J. ADAMS, HYUNGYU JIN, JOSEPH P. HEREMANS, The Ohio State University — Here we consider semiconductor composites as a way to yield high thermoelectric figure of merit. Effective medium theory limits the figure of merit of a composite made from two non-interacting materials, A and B, to the larger of the two [1, 2]. In previous work, we describe a mechanism that can lift this limitation by treating charge and heat flux separately. Silica beads coated with a conducting shell are inserted into a thermoelectric host. Thermal conductivity decreases with insulating material added, but electrical conductivity is maintained via locally conducting surfaces. We apply the theory to p-type (Bi,Sb)2Te3 host material. Several permutations are possible: Te-coated beads in Sb-rich material, or Sb-coated beads in Te-rich material. First, we review data for varying bead coatings and heat treatments, followed by varying stoichiometry in the host. New data considers an additional parameter of varying bead diameter, as well as optimizing these parameters simultaneously to enhance thermoelectric performance. References: [1] David J. Bergman and Ohad Levy, J. Appl. Phys. 70 6821 (1991) [2] David J. Bergman and Leonid G. Fel, J. Appl. Phys. 85 8205 (1999)

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