



Chemistry, Physics, and Materials Science of Thermoelectric Materials: Beyond Bismuth Telluride (Fundamental Materials Research)

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This series of books, which is published at the rate of about one per year, addresses fundamental problems in materials science. The contents cover a broad range of topics from small clusters of atoms to engineering materials and involve chemistry, physics, materials science, and engineering, with length scales ranging from Angstroms to millimeters. The emphasis is on basic science rather than on applications. Each book focuses on a single area of current interest and brings together leading experts to give an up-to-date discussion of their work and the work of others. Each article contains enough references that the interested reader can access the relevant literature. Thanks are given to the Center for Fundamental Materials Research at Michigan State University for supporting this series. M.F. Thorpe, Series Editor E-mail: thorpe@pa.msu.edu East Lansing, Michigan, November 2002 v PREFACE

This volume records invited lectures given at the New Thermoelectric (TE) Materials Workshop held in Traverse City, Michigan from August 17-21, 2002. The theme of the workshop was Chemistry, Physics and Materials Science of Thermoelectric Materials: Beyond Bismuth Telluride. The objective of this symposium was threefold. First, to examine and assess the ability of solid state chemistry to produce new generation materials for TE applications. Second, to rationalize and predict the charge and heat transport properties of potential candidates and hypothetical systems through solid state theory and experiment. Third, to identify and prioritize research needed to reach various levels of requirements in terms of ZT and temperature. These objectives were addressed by a series of invited talks and discussions by leading experts from academia, government laboratories, and industry. There were twenty-two invited and eight poster presentations in the workshop. Out of these, sixteen invited presentations are represented in this volume. They cover a wide range of subjects, starting from synthesis (based on different strategies) and characterization of novel materials to a careful study of their transport properties and electronic structure. Topics addressing the issue of making new materials are: synthetic search for new materials (di Salvo et al.) and synthetic strategies based on phase homologies (Kanatidis). The different classes of materials covered are: bismuth nanowires (Dresselhaus et al.), unconventional high-temperature thermoelectrics, boron carbides (Aselage et al.), layered cobalt oxides (Fujii et al.), early transition metal antimonides (Kleinke et al.), skutterudites (Uher), and clathrate thermoelectrics (Nolas).

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