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

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Synopsis:

Thermoelectric materials may be used for solid state refrigeration or power generation applications. Due to increasing need for alternative energy sources providing electrical power directly from heat sources and for environmentally friendly refrigeration, research in new thermoelectric materials has undergone a rebirth in the last decade. The search for new thermoelectric materials exhibiting exceptionally large Peltier effect focuses on novel concepts and novel solid state materials. To be an effective thermoelectric material, a compound must possess a large Seebeck coefficient, a low resistivity and a low thermal conductivity. How to achieve simultaneously these properties is the subject of considerable challenge in condensed matter physics and solid state chemistry. New materials and new material concepts such as quantum well and superlattice structures gave hope to the possibilities that might be achieved. An effort was made to focus on these new materials that go beyond Bi2Te3 alloys. This volume: Chemistry, Physics and Materials Science of Thermoelectric Materials: Beyond Bismuth Telluride contains a series of topical articles that were presented as invited lectures by prominent leaders in this field at a workshop held in Traverse City, Michigan in the summer of 2002. These articles place the state of the art, regarding design principles, candidate materials and systems and current advances in context and should serve as a useful source of insights into this field for both beginning students and practitioners alike.

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