

engineers/scientists working the field of polymer science who need a good book on fundamentals.

Thermoelectrics Handbook—Macro to Nano

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Conventional metallic thermocouples are thermoelectric elements made from metal or metal alloys. They typically generate small, typically tens of mV/degree temperature difference by the Seebeck effect. They also can generate small amounts of electrical power when connected to a resistive load. This book is not about conventional thermocouples but

rather thermocouples made from modern semiconductors whose material properties and geometry have been tailored specifically to meet the intended application and possess Seebeck coefficients of hundreds of mV/degree. The shape and size of the semiconductor depends on the application. In larger devices for heat generation or cooling applications, the semiconductors can consist of two ingot-shaped pellets with millimeter size dimensions or in a flat, wafer-shaped geometry. They also can be made as thin films or in nanostructures.

This book covers the general principles and theory, material preparation and measurements of thermoelectric materials, thermoelements, thermoelectric systems, and applications. The book starts with the basic concepts for thermocouples and applies this to semiconducting materials on a macro scale. Each chapter progresses from macroscale to micro/nano scale topics. There is a tremendous wealth of materials information on a wide range of thermoelectric materials and geometry presented in graphical form. In addition to

the thermoelectric coefficient (Seebeck coefficient) of the material, there also is electrical resistivity, thermal diffusivity, specific heat, and thermal conductivity. There are also some graphs depicting the dependence on the magnetic field of the magneto-thermo power of various doped semiconductors. There are many sections on material preparation, and measurement technique with sufficient technical depth to replicate the setups.

Because many of the most recent advances have been directed toward nanoscale devices and materials, the majority of the book covers nanobase materials and applications, including thin-film structures. Some examples include carbon nanotubes, quantum dots, thermal conductivity of nanostructures, and IV-VI and V-VI based nanostructures are presented.

Material scientists, engineers, academia, students working in the field of thermoelectric materials would find this book to be a wealth of information and a very convenient single source for material properties.



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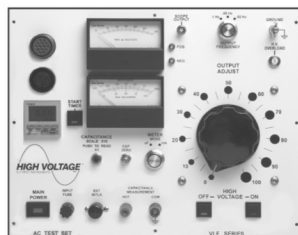
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