Journal of Nanomaterials

Special Issue on
Nanostructured Thermoelectric Materials and Devices

CALL FOR PAPERS

Thermoelectric (TE) materials can recover waste industrial heat and convert it to electricity and provide efficient local cooling for modern electronic devices. The efficiency of such environmentally responsible and exceptionally reliable solid state energy conversion is determined by the dimensionless TE figure-of-merit $ZT = \alpha^2\sigma T/\varkappa$, where α is the Seebeck coefficient, σ is the electrical conductivity, $\varkappa$ is the thermal conductivity, and T is the absolute temperature. The best commercialized TE materials (Bi_2Te_3-based alloys) possess a ZT only around one at room temperature, whereas a higher ZT is desirable for more efficient TE devices.

Since the first experimental demonstration in superlattices, led by Prof. M. S. Dresselhaus 20 years ago [*Phys. Rev. B* 53, R10493 (1996)], the TE community has witnessed the renaissance of enhancing ZT well beyond unity (even above two in most recent years) in novel materials by various effective nanoscale strategies, such as (i) reducing $\varkappa$ via all-scale hierarchical phonon scattering and/or intrinsically large anharmonicity and (ii) enhancing the power factor ($\alpha^2\sigma$) through quantum confinement, modulation doping, energy filtering, and other new mechanisms.

The goal of this special issue is to present the challenges and opportunities in identifying novel thermogalvanomagnetic phenomena and developing high-performance and cost-effective TE materials, along with their integration into devices and processes toward large-scale production. We invite investigators to contribute original research articles as well as review articles, aiming to advance the transition from interdisciplinary sciences to practical deployments across a broad range of emerging applications.

Potential topics include, but are not limited to:

- Theory of phonon and electron transport properties and high-throughput materials design
- Thermodynamics, kinetics, growth mechanisms and mesoscale nonequilibrium synthesis
- Spin-Seebeck effect, photo-thermal effects and topological insulators
- Low-dimensional materials such as superlattices, thin films, and nanowires
- Multiple-length-scale bulk (oxides, chalcogenides, skutterudites, clathrates, and half-Heusler)
- Organic, amorphous, molecular, and other unconventional materials
- Integration, characterization, and applications of TE devices

Authors can submit their manuscripts via the Manuscript Tracking System at http://mts.hindawi.com/submit/journals/jnm/ntmd/.

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