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Nanoscale Heat Transfer Phenomena: Ballisticity, Rectification, Collective Modes, Thermohydrodynamics, Coherence

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Message from the Guest Editors

The thermal transport differs significantly in nanostructures and nanostructured materials compared to their bulk state. In the last two decades, both computational and experimental studies have revealed several new phenomena like phonon confinement, blocking/focusing, or coherent, collective thermo-hydrodynamics, as well as rectification effects and new regimes like ballistic or quasi-ballistic related to like-Levy phonon flights. Observations showed that the Fourier's Law or even the Boltzmann's Transport Equation cannot capture these phenomena, as there is a breakdown of the macroscopic well-established heat dissipation theory due to the relative comparison of the phonon mean free paths/coherence length with the characteristic dimensions of the nanostructures and the presence of interfaces and free surfaces.

This Special Issue in Nanomaterials will attempt to cover the most recent advances in "Nanoscale Heat Transfer Phenomena" and both experimental and theoretical evidences of ballistic transport, rectification, phonon collective modes, Levy phonon flights, and classical thermohydrodynamics.

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Message from the Editor-in-Chief

Nanoscience and nanotechnology are exciting fields of research and development, with wide applications to electronic, optical, and magnetic devices, biology, medicine, energy, and defense. At the heart of these fields are the synthesis, characterization, modeling, and applications of new materials with lower nanometer-scale dimensions, which we call "nanomaterials". These materials can exhibit unusual mesoscopic properties and include nanoparticles, coatings and thin films, metal–organic frameworks, membranes, nano-alloys, quantum dots, self-assemblies, 2D materials such as graphene, and nanotubes. Our journal, *Nanomaterials*, has the goal of publishing the highest quality papers on all aspects of nanomaterial science to an interdisciplinary scientific audience. All of our articles are published with rigorous refereeing and open access.

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