

Tentative Outline

Special Thematic Issue for the journal Current Smart Materials

Title of the Thematic Issue: Thermoelectric Performance at Nanoscale: Open Problems and Challenges

Guest Editor: Dr. Santanu K. Maiti

- **Scope of the Thematic Issue:**

Thermoelectricity - the conversion of heat energy to electrical energy may lead to a significant impact in solving the environmental energy crisis if the conversion efficiency ZT (commonly known as figure of merit, FOM) is good enough, as it can directly transform heat energy that is available almost everywhere into the electrical one. For bulk materials it is highly restricted since in these systems it is very hard to get simultaneously higher thermopower and lower thermal conductance, those are the key constituents for defining FOM.

Recent proposals have demonstrated that thermoelectric performance can significantly be enhanced using nanoscale systems, compared to traditional bulk materials, although too limited understanding is involved at nanoscale level. In view of this lack of understanding and its scientific and technological importance, certainly there exists a great opportunity for new discoveries. The present thematic issue welcomes the detailed review articles from the experts to enhance the understanding, substantiating and optimizing thermoelectric performance at nanoscale level. The successful completion of the project may provide valuable information for efficient energy conversion to satisfy the present energy demand.

Keywords: Thermoelectricity, Nanomaterials, Seebeck coefficient, Thermal conductance, Electrical conductance, Figure of merit.

Sub-topics:

The sub-topics to be covered within the issue should be provided: Some of the important topic are as follows.

- Seebeck effect
- Phonon transport
- Effect of dephasing
- Role of electron-electron interaction
- Dependence of spin-orbit coupling
- Effect of magnetic and electric fields
- Role of geometrical topology
- Multi-terminal quantum systems

Tentative titles of the articles and list of contributors:

Tentative titles of the articles and list of contributors with their names, designations, addresses and email addresses should be provided.

It can be decided properly after the announcement of this proposal. Without any document, it is quite difficult to invite people.

Schedule:

- ✧ Thematic issue submission deadline: After the on-line announcement (if the proposal is accepted), we can give a duration of six months.

Contacts:

Guest Editor Name: **Dr. Santanu K. Maiti, Associate Professor of Physics**

Affiliation: **Physics and Applied Mathematics Unit**

Indian Statistical Institute

203 Barrackpore Trunk Road

Kolkata-700 108, India

Email: santanu.maiti@isical.ac.in