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Thermo electricity enhanced catalysis

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The voltage generated in thermoelectric materials can supply energy to any energy demanding system when there is a chance of either existence of temperature gradient or the possibility to generate it if it does not cause any malfunction for the system. Electro/photo catalytic reactions are good example of such systems. Thermoelectric materials can act as mini voltage generators to boost catalytic reactions and hence reduce/eliminate the external bias energy. In this case, thermoelectric material has a function similar to but conceptually different from the catalyst. As recently solar energy has been widely considered as a renewable energy resource to direct or indirectly power up the catalytic reactions, a temperature gradient could be naturally established and be utilized in the system. We have investigated the catalytic performance of nano structured tellurides (e.g., Bi_2Te_3 and Sb_2Te_3) which are among the most known thermoelectric materials. By optimizing the structure, morphology and size of thermoelectric materials, they are utilized in different catalytic reactions. We observe that with the effect of temperature gradient these catalytically inert materials will contribute to and facilitate the catalytic reactions including electrochemical water splitting and photocatalytic hydrogen desorption.

Recent Publications

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Biography

Tiva Sharifi has completed her PhD in Material Science in Physics Department at Umeå University, Sweden. Her research has been mainly focused on the synthesis and understanding of the properties of doped carbon based materials for energy conversion reactions. She then moved to Ajayan Research Group at Rice University, Houston, TX and has completed her Post-doctoral research on the understanding and resolving of the properties of low-dimensional materials.

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