



SEMINARIO

# Nano-engineering Thermoelectric and the latest developments in Nanoporous Alumina Templates: From Swords to Butterflies

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In the present talk, I will discuss the recent advancement that we have done in the field of thermoelectricity for energy harvesting and in the preparation of porous alumina templates for surface nanostructuring and for obtaining 3D networks of nanowires.

Thermoelectric materials have been a focus of research for centuries, because the thermoelectric effects allow direct conversion between thermal and electrical energy, therefore providing an alternative for power generation and refrigeration. In the recent years, there was a renewed interest since those materials can be used to generate electricity using the gradient of temperature between the cars exhaust pipe and the atmosphere (so, reducing the CO<sub>2</sub> total emission of the vehicles). One of the possible ways to increase the efficiency of these materials is through nanostructuring since the introduction of interfaces and/or scattering sites acts as a phonon scattering centers. In the present talk, I will approach to different ways in which nanostructuring is helping to increase the efficiency of materials like Skutterudites, Si-Ge alloys or selenides prepared by different techniques such as ball milling and spark plasma sintering –SPS-, or Sputtering, or electrodeposition. And, I will correlate the nanostructure with their thermoelectric properties on the different systems. I will talk about the effects of topological insulator observed in thermoelectricity in Bi<sub>2</sub>Te<sub>3</sub> nanowires. And I will show a prototype prepared in one of the European projects.

I will also address the recent developments on surface nanostructuring and on three-dimensional alumina templates and the preparation of three-dimensional network of nanowires.