

ABSTRACT:

Engineering surfaces and coatings using micro-nanoparticles

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The development of new energy harvesting devices requires more and more advanced technologies and materials. From photovoltaics to thermionics, many devices need specific surface properties to reach high efficiency. In this talk, we will report on the development of functional surfaces and coatings using micro and nanoparticles as building blocks. In the last decade, the availability of colloids and particles with well-defined materials and dimensions expanded. The manufacturing of such particle improved in terms of scalability, quality and cost-effective products are now available. This is a game changer for the industrial production of new energy harvesting and energy-storage devices. From micro to nanoscale, the objective of this talk is to show how particles can be used and processed to add functionality to surfaces and coating in the context of energy production. In a first phase, we will show how microparticles can be used in thermionic devices (TIG) to control gap thickness between electrodes at high temperature. This requires specific particles and deposition process to manufacture thermally and electrically insulating structures on TIG collector. The second phase of the talk will focus on the development of functional, temperature resistant coatings based on metal-oxide particles. New types of metal oxide nanoparticles (zirconia, silica, magnesia) are being used for the development of high quality coatings that can be used to control thermal and electrical properties.