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Nanoscience as a discipline and its impact on modern society

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IUVSTA Nanometer Structures Division Highlights

Nanoscience as a discipline and its impact on modern society

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In the highlight seminar of scientific Nanometer Structures Division (NSD) of IUVSTA we provide an overview of some recent developments in nanoscience and how its applications comprise a vital contribution to social well-being, contributing to a sustainable economy. Nanoscience impacts on a variety of technologies such as energy, nano-electronics, communication, health, smart cities and the environment. Examples are given in a range of areas. New materials have mushroomed since development of nanomaterials – here we novel synthetic techniques, such as preparation of core-shell nanoparticles which are used to tune photocatalytic activity; formation of nano-columnar Ti displaying both antibacterial and black metal material properties; preparation of chalcopyrite nanowires, which can be applied in photovoltaics with high conversion efficiency'; growth of PdO-coated WO3 nano-needles showing extreme sensitivity and selectivity to hydrogen, and finally use of laser ablation to form nanoparticles, nanowires, and nanostructured materials. Nano-tools are also opening new opportunities. We present a reproducible method for depositing 1-2 nm passivation layers, with atomically sharp interfaces, for SiC nano-electronics devices. We present in addition, the use of atomic force microscopy to investigate enhancement of oil recovery in reservoirs, as well as to investigate wetting properties of unique WS2 nanotubes to elucidate their incorporation in biopolymers. Additional examples include controlled manipulation of single molecules by the AFM tip, a video-rate AFM to examine dynamics of biological systems, and controlled manipulation of organic semiconductor crystallites on 2D materials by the atomic force microscopy (AFM) tip. The seminar will include recent and significant achievements of the members of the Nanometer structures scientific division and their colleagues.

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