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Nano-materials for sensitized solar cells

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Nano-materials play a very important role as building block for many optoelectronic devices. They differ from bulk counterpart in the size, characteristic and their new physical properties and offer new opportunities to be employed in various applications. Zero dimensional (0D) and one Dimensional (1D) nanostructures have attracted lots of attention in solar energy harvesting, conversion and storage, owing to their unique physical and chemical properties. Nano-materials offer many advantages in energy conversion specifically in solar cells. These solar cells, depends on the physical interaction between nano-materials or chemical reaction at the surface or interface of the nano-materials. In this presentation, we will discuss the Zero and one dimensional nanostructures and the role they play in increasing the conversion efficiency of solar cells, taking in consideration the materials to be used to meet the main objective of developing an eco-green solar cell with high conversion efficiency.

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Porous nanoparticles entrapped pipette tips for sensitive detection of biomolecules

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In recent years, nanomaterials with ordered pores have been widely used for biomolecules detection due to the properties of tuneable pore size, high surface area and easily surface modification. Particularly, the combinations of nanomaterial with some advanced techniques, such as mass spectrometry, ensure the accurate analysis of biomolecules. However, the analysis of some low abundance biomolecules (e.g. insulin) in complex biological samples still remains a big challenge. To address this problem, a combo-pore approach utilizes materials with different pore sizes for sample pre-treatment has been developed for the sensitive detection of insulin. This advanced approach has been applied prior to mass spectrometer or enzyme linked immunosorbent assay (ELISA) to achieve better detection sensitivity in urine/serum. Furthermore, a novel combo-pipette-tips with different porous materials entrapped is developed as "smart" device for convenient pre-treatment. The application of nanoparticle entrapped pipette tips for sample pre-treatment has the advantages of easy operation and less sample loss. As both combo-pore approach and nanoparticle entrapped tips can be special designed for different targets, which hold great potential for application in the sensitive detection of various biomolecules of commercial and clinical significance.

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