

## Synthesis, Characterization and Applications of Some Selected Dye-Functionalized P and N-Type Nanoparticles in Dye Sensitized Solar Cells

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**Abstract :** Inorganic n-type (TiO<sub>2</sub>, CdO) and p-type (NiO, CuO) metal oxide nanoparticles were synthesized by a facile wet chemical method at room temperature. The morphological, compositional, structural and optical properties were investigated by scanning electron microscopy, energy dispersive X-ray spectroscopy, FT-IR, XRD analysis, UV/Visible and fluorescence spectroscopy. All semiconducting nanoparticles were photosensitized with Ru (II) based Z907 dye in ethanol solvent by grafting. Grafting of dye on the surface of nanoparticles was confirmed by UV/Visible and FT-IR spectroscopy. The synthesized photo-active nanohybrid was thoroughly blended with P3HT, a solid electrolyte and I-V measurements under solar stimulated radiations 1000 W/m<sup>2</sup> (AM 1.5) were recorded. Maximum incident photon to current conversion efficiency (IPCE) of 0.9% was achieved with dye functionalized Z907-TiO<sub>2</sub> hybrid, IPCE of 0.72% was achieved with bulk-heterojunction of TiO<sub>2</sub>-Z907-CuO and IPCE of 0.68% was attained with nanocomposite of TiO<sub>2</sub>-CdO. TiO<sub>2</sub> based Solar cells have maximum Jscvalue i.e.4.63 mA/cm<sup>2</sup>. Dye-functionalized TiO<sub>2</sub>-based photovoltaic devices were found more efficient than the reference device but the morphology of the device was a major check in progress.

**Keywords :** solar cell, bulk heterojunction, nanocomposites, photosensitization, dye sensitized solar cell

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