University of Texas at San Antonio

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Time: 3:00 p.m.-4:00 p.m.

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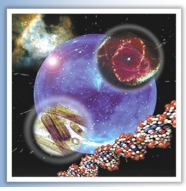
Nanostructured Hybrid CdS:P3HT Solar Cells

Nanostructured organic-inorganic photovoltaic solar cells have been prepared by low temperature solution methods. Semiconductor poly3-hexylthiophene (P3HT) was synthesized by oxidative polymerization. The obtained product was dissolved in dichlorobenzene and thin films obtained from this solution showed an optical band gap of 1.8 - 1.9 eV. Cadmium sulfide (CdS) particles of about 1 micron size were obtained by direct precipitation from cadmium and sulfur sources at about 0 °C for 24 h. Also uniformed CdS nanoparticles of 100 nm diameter were grown by chemical bath deposition at 60 °C for 3 h on the surface of cellulose acetate (CA) fibers of about 1 micron diameter (CdS (CA) fibers). CdS particles or CdS(AC) fibers were dispersed in different solvents, mixed with P3HT solution, and form active layers (heterojunctions) on transparent conductive glass sheets. Gold contact was evaporated on top of active layers to give an effective solar cell area of about 0.2 cm^2. It is found that photovoltaic properties of CdS:P3HT or CdS(AC):P3HT solar cells depend on the solvent type for CdS dispersion as well as on the drying and annealing process during the active layer preparation. The best CdS:P3HT hybrid cells show a photocurrent density at short-circuit (Jsc) of 2 mA/cm^2, a photovoltage at open-circuit (Voc) of 0.88 V and a fill factor (ff) of 0.39. Further research works are suggested to reduce the resistance in series and therefore to increase the energy conversion efficiency of CdS:P3HT based solar cells.



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