Optical and Morphological Properties of Polymer/Iron Pyrite Film for Bulk Hetero-junction Solar Cells

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About 20 years ago, iron pyrite (FeS_2) was proposed as a promising photovoltaic absorber material for thin film solar cells. FeS2 nanocrystals (NCs) have suitable energy bandgap (Eg=0.95 eV), strong light absorption (α > 105 cm-1 for hν > 1.3 eV), and an adequate minority carrier diffusion length (100-1000 nm). We blend the low-cost, nontoxic NCs with a polymer to form an active layer of bulk hetero-junction solar cells. The NC structure's, optical properties are measured by using TEM, UV-Vis and photoluminescence techniques. We determine the influence of FeS_2 concentration and loading amount in chloroform as mixing with polymer. With the particular advantages of pyrite, devices based on polymer/FeS_2 NCs are for increasing the efficiency of bulk hetero-junction solar cells.