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ABSTRACTS

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Nanoscale Photovoltaic Devices Using Organic Based Hybrid Nanostructures

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Organic based hybrid nanostructures such as nanoparticles (NPs) and nanowires (NWs) were fabricated by blending of organic *p*-type and (in) organic *n*-type materials. The hybrid NPs of *p*-type poly (3-hexylthiophene) (P3HT) and *n*-type [6,6]-phenyl C_{61} butyric acid methyl ester (PCBM) were prepared through a mini-emulsion method. The hybrid nanowires (NWs) consist of the functionalized CdSe/ZnS quantum dots (QDs) and P3HT or metal NWs. From the SEM, HR-TEM, and AFM experiments, the physical dimension and surface morphology of hybrid NPs and NWs were investigated. Structural characteristics of the hybrid nanostructures were studied through UV/Vis absorption and Raman spectra. The nanoscale photoluminescence (PL) characteristics of the hybrid NPs and NWs were measured by using a high-resolution laser confocal microscope (LCM). For the hybrid NPs, the LCM PL characteristics of the *n*-type PCBM were enhanced due to phase separation induced by the annealing process. Using the conducting-AFM experiments, the nanoscale photovoltaic and photodiode effects have been observed for the P3HT/PCBM single NP. The optoelectronic characteristics of the P3HT/CdSe-QDs NWs and metal/CdSe-QDs NWs were measured and analyzed.