Solution Processable P3HT/CdS Photodiodes and Their Electrical Characterization

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In this work we apply simple layer solution deposition methods for the assembling of CdS/P3HT (poly(3-hexylthiophene)) p-n heterostructures and analyzed their photodetection properties in the visible optical range. The CdS-n layers were deposited on ITO-coated glass substrates by the chemical bath method employing an ammonia-free recipe. The P3HT-p layers were deposited on the CdS/ITO/glass substrates by the casting method from solution by dissolving P3HT in chloroform. As the back electrodes, to complete the p-n heterostructures, carbon (graphite) was used. The electrical properties of the assembled CdS/P3HT hybrid photodiodes in dark and under illumination at several intensities, in the 0-100 mW/cm² interval, were analyzed from current density versus voltage (*J-V*) measurements, in the -5V to 5V bias voltage range. From these measurements, the photosensitivity of the photodiodes as a function of bias voltage was determined as 370 mA/W. The response of the photodiodes as a function of illumination intensity was determined from transient photocurrent measurements.

Keywords: photosensors; hybrid photodiodes; solution growth; chemical deposition.

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