ELECTRODEPOSITED NANOSTRUCTURED CdSe/CdS MATRIX FOR HYBRID SOLAR CELLS

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Solar cells based on n-type nanostructured semiconductor materials combined with p-type electrically conductive polymers have attracted attention of researchers in recent decades. Nanostructured thin films advantages are higher effective surface area to volume ratio and tunability of optical and electrical properties.

In this study hybrid structures were fabricated (Fig. 1). CdS, CdSe and PPy thin films were synthesized electrochemically, while PCDTBT:PCBM was spin coated. Deposition of a nanostructured CdSe thin film with a thickness of 600 - 700 nm increased an effective surface. Application of a CdS buffer between ITO and CdSe helped to increase the active interface area. Formation steps and post-deposition treatment of inorganic layers increased photocurrent value from $7 \cdot 10^{-4}$ mA/cm^2 for as deposited CdS to 2.2 mA/cm^2 for annealed CdSe/CdS at 0.5 V vs. SCE. We determined an optimal potential of 0.2 V vs. SCE for the electrodeposition of pyrrole on CdSe/CdS under Xe illumination. The best photovoltaic parameters were obtained for the graphite/PPy/CdSe/CdS/ITO/glass structures. In addition, increase of the PPy electrodeposition period from 10 to 60 min led to improvement of the cell parameters.

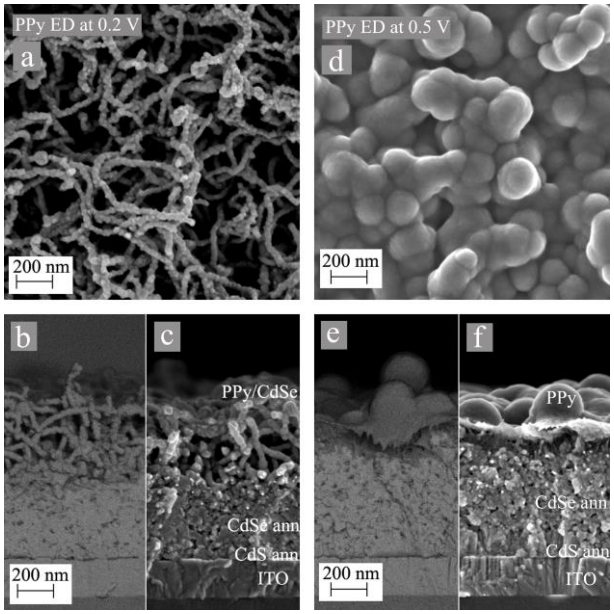

Fig. 1. Surface and cross-sectional micrographs of hybrid structures with PPy ED at (a, b, c) 0.2 V and (d, e, f) 0.5 V vs. SCE.

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