ZnO Nano-Flower Deposition on Top of Rectifying Metal-Semiconductor Contacts Towards an Active Structure Formation

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Rectifying metal-semiconductor contacts of zinc blende (111) CdSe films were electrolytically grown on pure Ni substrates. ZnO nano-flowers (grown hydrothermally) were deposited on top of the CdSe layer by spin-on coating, and by casting technique. The 3D morphology and overall structure of the Ni/CdSe/ZnO specimens were characterized by XRD, SEM, EDAX and optical measurements of energy gap. The electrical properties of the investigated material structures were determined by measuring I-V characteristics of Ni/CdSe/Au, and Ni/CdSe/ZnO nano-flowers/Au structures, in the dark and following vacuum dehydration. According to the experimental results the incorporation of ZnO nano-flowers provides electrically active structures, possibly due to ongoing atmospheric ion neutralization processes. Thus, the deposition of ZnO nano-flowers may be practically utilized on top of photovoltaic (PV) semiconductor cells to offer: enhanced conversion efficiencies, protection of underlying semiconductor layers against UV-photons, and elimination of surface recombination of electronic carriers by exploiting the energy gap variations across the interconnected materials to push away the minority carriers.

Keywords: ZnO nano-flowers, CdSe electrodeposition, ZnO/CdSe contacts, active structures, energy harvesting.

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