

Photovoltaic Performance of AgInSe₂-Conjugated Polymer Hybrid Systems

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Abstract : We investigated blends of MdPVV.PCBM.AIS for photovoltaic application. AgInSe₂ powder was synthesized by sealing and heating the stoichiometric constituents in evacuated quartz tube ampule. Fine grinded AIS powder was dispersed in MD-MOPVV and PCBM with and without surfactant. Different concentrations of these particles were suspended in the polymer solutions and spin casted onto ITO glass. Morphological studies have been performed by atomic force microscopy and optical microscopy. The blend layers were also investigated by various techniques like XRD, UV-VIS optical spectroscopy, AFM, PL, after a series of various optimizations with polymers/concentration/deposition/ suspension/surfactants etc. XRD investigation of blend layers shows clear evidence of AIS dispersion in polymers. Diode behavior and cell parameters also revealed it. Bulk heterojunction hybrid photovoltaic device Ag/MoO₃/MdPVV.PCBM.AIS/ZnO/ITO was fabricated and tested with standard solar simulator and device characterization system. The best performance and photovoltaic parameters we obtained was an open-circuit voltage of about Voc 0.54 V and a photocurrent of Isc 117 micro A and an efficiency of 0.2 percent using a white light illumination intensity of 23 mW/cm². Our results are encouraging for further research on the fourth generation inorganic organic hybrid bulk heterojunction photovoltaics for energy. More optimization with spinning rate/thickness/solvents/deposition rates for active layers etc. need to be explored for improved photovoltaic response of these bulk heterojunction devices.

Keywords : thin films, photovoltaic, hybrid systems, heterojunction

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