3. Conclusions

With the introduction of high level of porosity in the ZnO electron selective layer in an inverted OPV, the ZnO layer acts as a scattering-center. The superior performance of the OPV device with highly porous ZnO layer is attributed to the porous layer created and controlled using polyethylene glycol template with an optimized ZnO:PEG ratio and active layer spin-coating speed. The highly porous ZnO layer provides increased light trapping, the role of which has been substantiated by device measurements and the layer characterizations performed. By employing the porous ZnO layer in the inverted OPV device, a current density of 11.34 mA/cm^2 and an efficiency level of 4.07% have been obtained. This is a marked improvement over the device performance of the reference sample with the non-porous ZnO layer. The use of such porous nanostructures can be extended to other metal oxides for both regular and inverted OPVs, which is being currently investigated. Porous metal oxide layers can also be applied to OPV systems with different active layer components, thus making porous light-scattering interlayers a highly portable method of efficiency improvement in organic photovoltaics.

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