Synthesis of Thinner Electrodeposited Polymer Solar Cell Interfaces in Organic Photovoltaics (OPVs)

Iyengar, Adithya

OPVs (Organic Photovoltaics) are highly tunable based on monomer composition. In other studies, PEDOT:PSS or (poly-3, 4-ethylenedioxythiophene:poly-styerenesulfonate) has been championed over other blends due to improved electron/hole transportation abilities and good optical/electrical properties. Above that, a layer of P3HT:PCBM (poly-3-hexylthiophene:phenyl-C61-butyric acid methyl ester) is added to help facilitate proper charge transfer, ensuring that the electrons and holes (quasi positive particles) go to their respective electrodes. In this study, the same approach was taken, however PEDOT:PSS was replaced with ePEDOT:HFP, taken from TBAHFP (tetrabutylammonium hexafluorophosphate). The monomer was electropolymerized onto the ITO substrate. ePEDOT:HFP performed slightly better than the PEDOT:PSS blend, obtaining an efficiency of 3.66% compared to 3.62%. The thicknesses of the electropolymerized film were 5-10 nm whereas the PEDOT:PSS ranged from 40-50 nm. This shows comparable results and suggests thinner future organic solar cells with higher efficiencies. Future directions of research include optimization of ePEDOT:HFP through monomer concentration variance.

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