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The Study on the the P3HT:PCBM Bulk Heterojunction Solar Cells Utilizing WO_3 Nano-particle As a Hole Transporting Layer

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The PEDOT:PSS layer is usually used as hole transporting layer for the polymer bulk heterojunction solar cells. However, the interface between ITO and PEDOT:PSS is not stable and the chemical reaction between ITO and PEDOT can result in degraded device performance. We used the tungsten oxides as a hole transport layer by spin-coating. The WO_3 nanoparticles were well dispersed in ammonium hydroxide and deionized water and formed thin layer on the ITO anode.

We found that WO_3 surface is more hydrophobic than the bare ITO or PEDOT:PSS-coated surfaces. The hydrophobic surfaces promote an ordered growth of P3HT films. A higher degree of P3HT ordering is expected to improve the hole mobility and the lifetime of the device using the tungsten oxide showed better stability compared to the device using the PEDOT:PSS.