

Metal oxides and organic molecules for interface engineering in high performance polymer solar cells

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Polymer solar cells (PSCs) are one of the most attractive solar cell technologies as they combine the controlled functionalization and optoelectronic properties of conjugated polymers with solution processability, flexibility and low cost. One of the most critical components that affects device efficiency and stability is the functionality of the interfaces between the electrodes and the organic layers employed. To this regard, various interfacial engineering strategies have been exploited to control charge injection/extraction, transport and recombination, and improve device performance. [1] Herein, we investigate in detail representative inorganic and organic compounds, namely metal oxides such as fluorine-doped tantalum pentoxide [2] and organic small molecules such as functionalized boron-dipyromethenes (BODIPYs) [3], that can be deposited at low temperatures or processed directly from orthogonal solvents (with regard to conjugated polymers) as highly effective interfacial layers for improved hole and electron transfer/extraction, respectively, in PSCs. As a result, significant improvements in both efficiency and stability of bulk heterojunction PSCs based on various commercially available organic semiconductors was achieved as a result of improved interfacial energetic level alignment facilitating charge transport/extraction.

References

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