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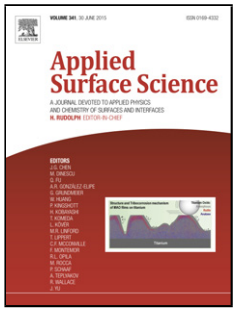

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Interfacial engineering of electron transport layer using Caesium Iodide for efficient and stable organic solar cells

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Highlights:

- Effect of pure CsI ETL in PTB7:$PC_{71}BM$ polymer solar cell is studied
- CsI/ZnO bi-layer ETL is incorporated instead of CsI or ZnO ETL
- CsI layer modifies energy level alignment at ITO/ZnO interface
- New ETL improves both device efficiency and UVO stability

ABSTRACT:

Polymer solar cells (PSCs) have gained immense research interest in the recent years predominantly due to low-cost, solution process-ability, and facile device fabrication. However, achieving high stability without compromising the power conversion efficiency (PCE) serves to be an important trade-off for commercialization. In line with this, we demonstrate the significance of incorporating a CsI/ZnO bilayer as electron transport layer (ETL) in the bulk heterojunction PSCs employing low band gap polymer (PTB7) and $PC_{71}BM$ as the photo-active layer. The devices with CsI/ZnO interlayer exhibited substantial enhancement of 800% and 12% in PCE when compared to the devices with pristine CsI and pristine ZnO as ETL, respectively. Furthermore, the UV and UV-ozone induced degradation studies also revealed that the devices incorporating CsI/ZnO bilayer possess excellent decomposition stability (~23% higher) over the devices with pristine ZnO counterparts. The