Eliminating surface defects at transport layer-bulk heterojunction interfaces in OPVs

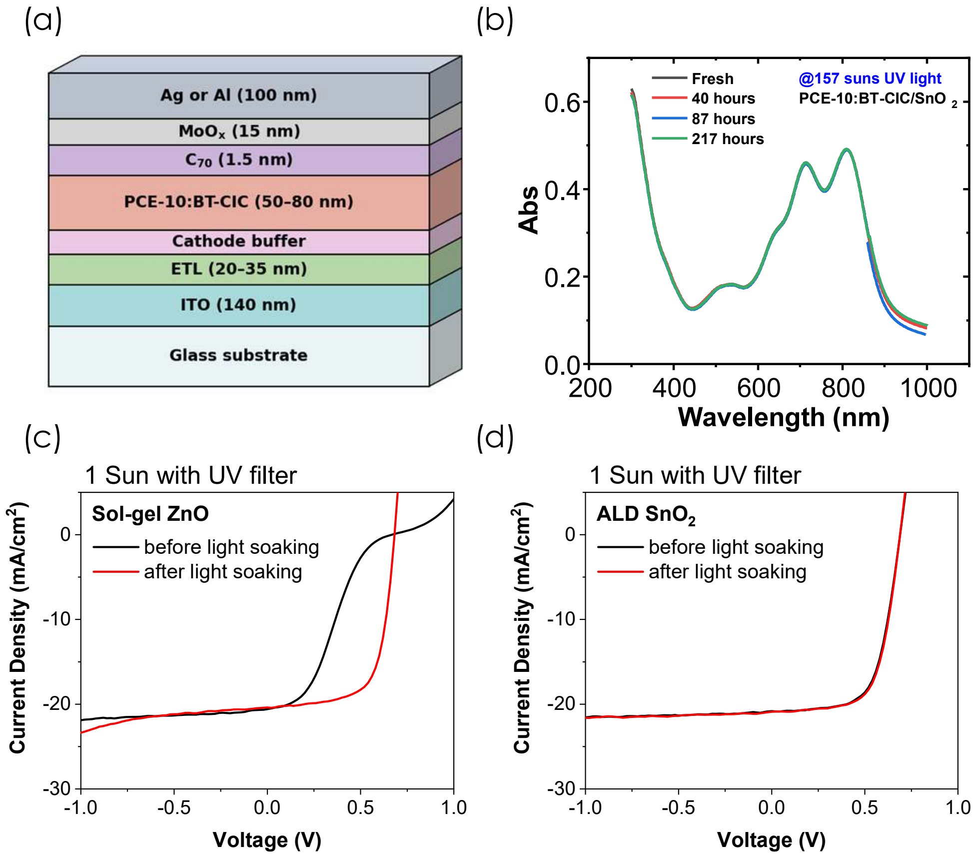

Figure: (a) OPV device structure. (b) Absorption spectra of PCE-10:BT-CIC/ALD SnO_2 aged under 375 nm LED with 157 UV-suns intensity illustrating photostability of active layer with this metal oxide. Current density-voltage characteristics of (c) Sol-gel ZnO and (d) ALD SnO2 before and after UV light soaking for one minute.

Objective

- ➢ To investigate the physical mechanisms underlying the light soaking effect in common metal oxide electron transport layers (ETLs), develop strategies to eliminate it, and improve device operational stability

Impact

One of the most commonly used materials for the ETL in organic photovoltaics, ZnO, often relies on UV light soaking to remove electron-trapping oxygen adsorbates. However, this exposure can accelerate photochemical degradation of the organic active layer. The development of an ETL that eliminates the need for UV light soaking while maintaining long-term chemical stability at the interface is crucial.

Facilities and Methods Used

- Fabrication: solution processing, vacuum thermal evaporation
- Characterization: solar simulator, ellipsometer, XPS, SEM, XRD, UPS, AFM

Relevant Papers

- Y. Li, et al., *Nature Comm.*, DOI: https://doi.org/10.1038/s41467-021-25718-w.

Funding

- Universal Display Corporation, Department of Energy, Office of Naval Research

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