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Revealing the effect of solvent additive selectivity on formation kinetics in slot-die coated organic solar cells at ambient conditions

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Solvent additives have received tremendous attention in organic solar cells as an effective way to optimize morphology and phase separation. However, most research primarily focuses on solvent additives with superior solvation for non-fullerene acceptors (NFA) over polymer donors, such as the 1-chloronaphthalen (1-CN), 1, 8-diiodooctane (1,8-DIO). Few researches are related to solvent additives characterized by better solubility for polymer donors than NFA. Furthermore, the impact of solvent additives is mainly investigated through spin coating rather than slot-die coating, which exhibits distinct kinetics in film formation. Hence, the influence of solvent additive selectivity on the kinetics of active layer formation in the printed active layer remains unknown. In this study, we use PBDB-T-2F as the donor and BTP-4F as the acceptor and introduce two distinct solvent additives—one with superior solubility for PBDB-T-2F compared to BTP-4F, and the other with inferior solubility for PBDB-T-2F. The drying process of the slot-die coated active layer with different solvent additives will be studied by in situ UV-vis absorption spectra and in situ Grazing Incidence Wide Angle X-Ray Scattering (GIWAXS).

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