

Using X-ray Scattering Techniques to Probe Hierarchical Nanomorphology of Bulk Heterojunction Organic Solar Cells

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Organic photovoltaic (OPV) is positioned as one of future technologies for the solar energy. The nanomorphology of bulk heterojunction (BHJ), hierarchically composed of pure polymers, pure fullerene, and molecularly mixed polymer-fullerene, is the most promising architecture for the OPV.

In the poster, we aim to comprehend the complex morphology of indacenodithiophene-based polymers (PIPCP) and fullerenes BHJ systems which possess a low energy loss to achieve the maximum open-circuit voltage (V_{OC}) in devices. The complemented X-ray scattering techniques are indispensable to uncover the structural features such as molecular packing, the mixed phase, domain size, and purity. Thermal and solvent vapor annealing is further employed to manipulate the morphology for the BHJ film. Among the goals of this work is to provide significant morphological information and assist in the development of new class of high V_{OC} materials for OPV.