

Invited

Structure Measurements for Organic Photovoltaics Manufacturing

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Organic photovoltaic (OPV) technology has significantly matured over the past few years, but there remain many challenges in OPV manufacturing, from materials selection, to device design, to design and control of the fabrication process. This talk will describe our efforts to develop measurements that support OPV manufacturing. An important issue in materials selection is the identification of OPV systems that perform well even when the polymer-fullerene blend is coated at thicknesses greater than 100 nm. Some systems that work well appear to have slowed bimolecular recombination, but the origin of this feature is unclear. I will discuss our efforts to identify it using structural characterization. Solution formulation and the design of the coating process could also benefit from structural characterization during the film solidification process itself. Using a blade coating process as a prototype for slot-die coating, we have developed several techniques to observe the structure of OPV films in-situ as they dry. We use these techniques to identify the mechanisms by which different formulations influence the structure of the final films. Using in-situ techniques provides more information about the solidification process than can be obtained by measuring already-dried films, providing a valuable tool to guide the selection of formulation and processing parameters.