

Slot Die Printing at a Synchrotron

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In order to move closer and closer to real processing conditions of polymer thin films we installed a industrial level slot-die printer at our SAXS/WAXS beamline at the ALS. The slot-die printer has since been opened up to a wide variety of users and materials. We are able to print and measure the drying process in real-time in GISAXS and GIWAXS geometry. In addition we developed a data pipeline and analysis framework to handle, store and analyze the data. The goal was to provide real-time feedback to scientists during beamtime. HipGISAXS was used in a real time demonstration that married the slot-die printing with the data handling and processing capabilities at NERSC, and simulation capabilities of running at-scale simulations on Titan at OLCF. The demo involved the printing of organic photovoltaics using a slot-die printer. Over the span of 3 days many different organic photovoltaics were printed at the beamline and the crystal structure evolution during drying was recorded using GIWAXS. The entire progress of data collection, movement and fitting was monitored on a web dashboard.