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Polarized soft X-ray scattering reveals differences in chain orientation within block copolymer lamellae JOSHUA LITOFSKY, THINH LE, MELISSA APLAN, YOUNGMIN LEE, ENRIQUE GOMEZ, Pennsylvania State Univ — Fully conjugated block copolymers can serve as the active layer in organic photovoltaics (OPV) and other organic electronic devices. The use of Resonant Soft X-Ray Scattering (RSoXS) allows for studies into the molecular orientation and domain spacing of the polymers within lamellae by tuning the X-ray energy and polarization to examine various components of block copolymers. Using the conjugated block copolymer system of poly(3-hexylthiophene)-*block*-poly((9,9-dioctylfluorene)-2,7-diyl-alt-[4,7-bis(thiophen-5-yl)-2,1,3-benzothiadiazole]-2',2"-diyl), P3HT-b-PFTBT, and PFTBT derivatives, we can examine the effects of various polymer blocks on the differences of morphology between the donor and acceptor. Polarized Soft X-Ray Scattering (PSoXS) allows us to quantify the type and the degree of orientation of chains within block copolymer domains in thin films. Our work suggests that within our conjugated block copolymers, the P3HT chains orient parallel to the block copolymer interface. Furthermore, examining the anisotropy in PSoXS data provides a clear signature of the block copolymer microstructure, confirming the domain spacing extracted from PSoXS scales with the end-to-end distance of the blocks.

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