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Synthesis and Characterization of All-Conjugated Block Copolymers Prepared via Click Chemistry[1] RAFAEL VERDUZCO, KENDALL SMITH, Rice University — All-conjugated block copolymers with both hole-conducting and electron-conducting polymer blocks can be used to address fundamental questions regarding the structure, optoelectronic properties, and photovoltaic performance of organic photovoltaic blends, but synthetic challenges have precluded comprehensive studies on such systems. Here, we present a novel synthetic approach for preparing all-conjugated block copolymers and detailed studies of their nanoscale structure and optical properties. Our synthetic approach is based on copper-catalyzed azide-alkyne "click" chemistry and enables us to prepare block copolymers with a poly(3-alkylthiophene) block covalently linked to a conjugated polymer prepared by Suzuki polycondensation polymerization, including poly(9,9-dioctyl fluorene), poly(9,9-dioctyl fluorene-alt-benzothiadiazole) and poly((9,9-dioctylfluorene)-2,7-diyl-alt-[4,7-bis(thiophen-5-yl)-2,1,3-benzothiadiazole]-2',2"-diyl) (PFOTBT). A combination of x-ray diffraction, grazing-incidence x-ray scattering, atomic force microscopy, and fluorescence quenching measurements give insight into their microstructure and potential for use in high-performance all-polymer photovoltaics.

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