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Synthesis and Characterization of a Systematic Series of All-Conjugated Diblock Copolymers[1] KENDALL SMITH, RAFAEL VERDUZCO, Rice University — All-conjugated block copolymers can potentially self-assemble into nanoscale structures beneficial for charge separation and transport, but due to synthetic challenges a comprehensive investigation of all-conjugated block copolymers has not been carried out . Here we detail a novel synthetic approach to all-conjugated block copolymers and characterize the structure of a systematic series of materials. The materials are prepared via copper-catalyzed azide-alkyne click chemistry followed by selective solvent removal of homopolymer impurities. This allows us to readily vary the molecular weight and type of each block in order to systematically study the properties of a family of block copolymers. As a system relevant to organic photovoltatics, we investigate a series of diblock copolymers based on poly(9,9-dioctyl-fluorene) and poly(3-alkylthiophene). This series of block copolymers is characterized with respect to phase behavior, including micro-phase segregation and crystallinity, optical properties, and charge mobilities.

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