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Structure/property relationships in high hole mobility regioregular PT based copolymers LOUIS PEREZ, LEI YING, GUILLERMO BAZAN, EDWARD KRAMER, University of California - Santa Barbara — The synthesis of novel solution processable conjugated polymers with high hole mobilites is an active field of study due to the potential to fabricate low cost, high though-put, lightweight organic field effect transistors (OFET). Two regioregular copolymers, based on cyclopenta[2,1-*b*:3,4-*b*′]dithiophene (CDT) and pyridal[2,1,3]thiadiazole (PT) structural units, have been prepared by using polymerization reactions involving reactants specifically designed to avoid random orientation of the PT heterocycle. Compared to their regiorandom counterpart, the regioregular polymers exhibit a two orders of magnitude increase in hole mobility from 0.005 to 0.6 cm^2V^{-1} s^{-1}. Grazing incidence wide angle X-ray scattering (GIWAXS), near edge X-ray absorption fine structure (NEXAFS) spectroscopy, and transmission electron microscopy were carried out to obtain further insight into possible differences of structural order within the bulk and interfaces of the thin films. It was found that the backbone regioregularity leads to significant differences in the structural arrangement of the chains and indicates the importance of regioregularity for achieving optimal electronic properties.

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