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Creating Efficient Quasi-3D Transport Pathways With Crossed-Chain Polymer Interfaces CHRISTOPHER TAKACS, MICHAEL BRADY, NEIL TREAT, MICHAEL CHABINYC, Univ of California - Santa Barbara — While our understanding of the local molecular packing in many well-performing polymer semiconductors has improved, many open questions regarding the molecular level details of long-range connectivity and the best strategies for optimizing electronic functionality remain. Here we focus on the possible benefits of epitaxy in polymer semiconductors for improving nano-scale connectivity, a concept particularly useful for systems where charge-transport is expected to be highly anisotropic. The periodic crossing of the non-parallel chains at the crystal-crystal interfaces may enable efficient coupling across grain-boundaries and increase the effective dimensionality of the charge transport processes. Using a combination of high-resolution transmission electron microscopy, statistical analysis of the electron micrographs, and a variety of molecular simulation methods, we will demonstrate that such epitaxy relationships can be predicted and observed in a variety of well-performing polymer semiconductors. The results suggest that further engineering of epitaxy may lead to substantial advances in both control of self-assembly and electronic performance.

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