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Charge transport in crystalline organic semiconductors: using polymorphs to explore the effect of crystal packing OANA JURCHESCU, National Institute of Standards and Technology, DEVIN MOUREY, Penn State University, SANKAR SUBRAMANIAN, SEAN PARKIN, University of Kentucky, BRANDON VOGEL, Bucknell University, JOHN ANTHONY, University of Kentucky, THOMAS JACKSON, Penn State University, DAVID GUNDLACH, National Institute of Standards and Technology — Organic semiconductors are a fascinating class of materials, with a wealth of properties and diverse technological potential. For small-molecule organic semiconductors, charge transport is closely related to the crystal packing motif. Polymorphism is frequently encountered in these materials, given the weak intermolecular interaction energies. This represents a unique opportunity to explore phenomena related to the fundamental mechanism of charge transport in organic semiconductors, such as the influence of the crystal packing. For example, 5,11-bis(triethylsilylethynyl)anthradithiophene has two polymorphs inter-convertible through phase transition that occurs at T= 294 K. We report on their crystal structure, formation, and the effect of the different molecular packing on the electronic properties. We discuss the technological implications that a room-temperature phase transition has on the performance and stability of devices fabricated with this material.

Oana Jurchescu
National Institute of Standards and Technology

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