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Correlating Structure and Conductivity of Pentathiopene Monolayers BAS HENDRIKSEN, YABING QI, FLORENT MARTIN, Materials Sciences Division, Lawrence Berkeley National Laboratory, FRANK OGLETREE, The Molecular Foundry, Materials Sciences Division, Lawrence Berkeley National Laboratory, MIQUEL SALMERON, The Molecular Foundry and Materials Sciences Division, Lawrence Berkeley National Laboratory — Understanding the electrical conduction mechanisms in organic materials is important for the development of plastic and molecular electronics. The charge transport properties of conducting molecular layers are expected to strongly depend on the order of the layer and the conformation of the molecules. We used atomic force microscopy (AFM) to study and correlate the structural, mechanical and electrical properties to molecular monolayers of pentathiophene based molecules on solid substrates prepared by the Langmuir-Blodgett technique. The molecular monolayers consist of two phases: one phase of compact micrometer size flower-shaped islands and a phase with less order and a high density of holes. We found that the perpendicular conductivity, i.e. through the monolayer sandwiched between the conductive AFM probe and the conductive substrate, is more than 5 times higher on the well-ordered island phase. This shows that the molecular lattice order has a significant effect on the electronic properties.

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