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Oligothiphene nanostructure evolution in transition from monolayer to multilayers. GEETHA DHOLAKIA, M. MEYYAPPAN, NASA Ames Research Center, Moffett Field, CA 94035, ANTONIO FACCHETTI, TOBIN MARKS, Department of Chemistry, Northwestern University, Evanston, IL 60208.
— Organic electronics offers tremendous potential in applications requiring structural flexibility and large area coverage, with the added advantage of low fabrication cost. While the mobilities of organic field effect transistors (OFETs) have recently increased to the level needed for practical applications, differences in the orientation of interchain stacking, as well as defects in the film interfaces and the presence of grain boundaries act as scattering centers and charge traps, hence degrade their performance. Here we present tunneling spectroscopic results and STM studies at the nanoscale analyzing the evolution in morphology and grain connectivity of fluoroalkyl-functionalized DFH-4T (a, w-diperfluorohexyl-4T) oligothiophene films on Au(111) substrates, as the thickness is varied from one monolayer to many multilayers. Monolayer thick DFH-4T films exhibit a featureless morphology except for a number of pits similar to those in self-assembled thiol monolayers, while multilayer films have a drastically different terraced morphology consisting of overlapping platelets. This study provides important information on the nature of the interface between organic semiconductors and the source\drain electrodes in OFET devices.

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