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Identification of the Possible Defect States in Poly(3-hexylthiophene) Thin Films DANQIN FENG, University of Nebraska-Lincoln, ANTHONY CARUSO, North Dakota State University, YAROSLAV LOSOVYJ, Louisiana State University, DOUGLAS SCHULZ, North Dakota State University, PETER DOWBEN, University of Nebraska-Lincoln — We find evidence for a gradual change in the electronic properties of regioregular poly(3-hexylthiophene) thin films with temperature. The conduction properties appears to be mediated by hopping conduction dominated by a low density of defects states within the highest occupied molecular orbital to lowest unoccupied molecular orbital gap, not by a change in band gap. The possible origins of a low density of defects states within the highest occupied molecular orbital to lowest unoccupied molecular orbital gap are suggested. A number of "chemical" defects, impurities and structural defects can contribute to features in photoemission for regioregular poly(3-hexylthiophene). A density of states within the highest occupied molecular orbital to lowest unoccupied molecular orbital gap may affect the transport properties of regioregular poly(3-hexylthiophene) and like polymers. These gap electronic states are not expected in the perfectly ordered polymer.

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