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**Electron Diffraction Study of Polymorphism of Pentacene Thin Films.** B.Q. Li, W.J. Huang, J.M. Zuo, Dept. of Materials Science and Engineering and Frederick Seitz Materials Research Laboratory, Univ. of Illinois, Urbana, IL 61801.

During the last few years, there has been an explosion of interests in exploring organic thin-films of small conjugated molecules, like pentacene ( $C_{22}H_{14}$ ), as active semiconductor devices. The full potential of organic thin-film semiconductor devices for applications will not be realized until the growth of highly ordered organic thin films can be optimized and well controlled. Thin films of pentacene are known to crystallize in different polymorphs, which have layered structures characterized by their different interlayer spacings,  $d(001)$ . How to grow highly ordered single phase molecular thin films remains a challenging subject. Motivated by this, we have investigated the growth of pentacene thin films on hydrogen-terminated Si (111) and clean Si (111) surfaces in an effort to gain a comprehensive understanding of the molecule-substrate interactions and explore strategies to suppress the formation of polymorphism and therefore to grow highly ordered pentacene thin films. Electron diffraction is used to investigate the in-plane molecular structure. The crystallographic results are correlated with growth. The detailed structural analysis results will be presented.