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Novel Materials for Organic and Thin Film Electronics

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Pentacene is highest mobility organic semiconductor known. It forms a crystalline molecular solid that can be deposited in thin film form by either vacuum sublimation or spin-coating. In this talk I will present results of in-situ growth studies of the vapor growth of thin pentacene films on a wide variety of substrates, utilizing video-rate high resolution Low Energy Electron Microscopy (LEEM) and Photo Electron Emission Microscopy (PEEM). We find that the molecular orientation in the thin film depends directly on the electronic structure of the substrate surface (insulator, semimetal, or metal). In addition, epitaxial pentacene films can be grown on relatively weakly coupling substrates, such as semimetallic Bi, as well as insulating alkane Self-Assembled Monolayers on Si(001). The results will be illustrated with dynamic video movies of typical growth sequences.