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Real-Time Monitoring of Organic Thin Film Morphology by Organic Vapor Phase Deposition RICHARD R. LUNT, JAY B. BENZIGER, Department of Chemical Engineering, Princeton University, Princeton, NJ, STEPHEN R. FORREST, Departments of Electrical Engineering and Computer Science and Physics, University of Michigan, Ann Arbor, MI — We demonstrate the real-time monitoring of the development of crystalline structure in the growth of films by organic vapor-phase deposition (OVPD) using high-pressure reflection high-energy electron diffraction (HP-RHEED). Through control of the probe electron beam energy, sample damage from impinging electrons was avoided and beam attenuation in the 8mTorr OVPD deposition environment was minimized. The growth of copper phthalocyanine (CuPc) on highly oriented pyrolytic graphite was used to demonstrate the ability of such *in-situ* organic-growth monitoring, where it was observed that the first several monolayers formed ordered films independent of the substrate temperature and deposition rate, while the evolution of thicker films was strongly affected by substrate temperature. Higher temperatures resulted in greater in-plane crystalline ordering. We thereby have shown HP-RHEED to be a powerful tool for real-time monitoring of growth morphology, ultimately leading to *in-situ* control of thin film crystalline order.

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