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Controlled Growth of Organic Semiconductor Films Using Liquid Crystal Solvents KEVIN BUFKIN, BROOKS OHLSON, BEN HILLMAN, BRAD JOHNSON, DAVID PATRICK, WWU — Interest in using organic semiconductors in applications such as large area displays, photovoltaic devices, and RFID tags stems in part from their prospects for enabling significantly reduced manufacturing costs compared to traditional inorganic semiconductors. However many of the best performing prototype devices produced so far have involved expensive or time-consuming fabrication methods, such as the use of single crystals or thin films deposited under high vacuum conditions. We present a new approach for growing low molecular weight organic crystalline films at ambient conditions based on a vapor-liquid-solid growth mechanism using thermotropic nematic liquid crystal (LC) solvents. Tetracene is deposited via atmospheric-pressure sublimation onto substrates coated by a LC layer oriented using rubbed polyimide, producing films that are highly crystalline, with large grain sizes, and possessing macroscopic uniaxial orientation. This poster will describe the growth mechanism, discuss the effects of processing conditions such as LC layer thickness, substrate temperature and flux rate, and compare the results to a model of deposition-diffusion aggregation accounting for the finite thickness of the solvent layer.

Brad Johnson
Western Washington University

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