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Preparing highly ordered glasses of discotic liquid crystalline systems by vapor deposition ANKIT GUJRAL, JARITZA GOMEZ, CAMILLE E. BISHOP, Univ of Wisconsin, Madison, MICHAEL F. TONEY, Stanford Synchrotron Radiation Lightsource, M.D. EDIGER, Univ of Wisconsin, Madison — Anisotropic molecular packing, particularly in highly ordered liquid-crystalline arrangements, has the potential for optimizing performance in organic electronic and optoelectronic applications. Here we show that physical vapor deposition can be used to prepare highly organized out-of-equilibrium (glassy) solids of discotic liquid-crystalline (LC) systems. Using grazing incidence x-ray scattering, we compare 3 systems: a rectangular columnar LC, a hexagonal columnar LC and a non-liquid crystal former. The packing motifs accessible by vapor deposition are highly organized and vary from face-on to edge-on columnar arrangements depending upon substrate temperature. A subset of these structures cannot be accessed under equilibrium conditions. The structures formed at a given substrate temperature can be understood as the result of the system partially equilibrating toward the structure of the free surface of the equilibrium liquid crystal. Consistent with this view, the structures formed are independent of the substrate material.

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