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Tuning the crystal structure of contorted hexabenzocoronene thin films for transistors applications ANNA HISZPANSKI, Chemical and Biological Engineering Department, Princeton University, MATTHEW BRUZEK, Chemistry Department, University of Kentucky, ARTHUR WOLL, Cornell High Energy Synchrotron Source, JOHN ANTHONY, Chemistry Department, University of Kentucky, YUEH-LIN LOO, Chemical and Biological Engineering Department, Princeton University — Though the structure of organic semiconductors in the active channels of thin-film transistors is known to impact device performance, controlling such structure has been a long-standing challenge. We demonstrate the ability to fine-tune the crystal packing of semiconducting contorted hexabenzocoronene (HBC) thin films via solvent-vapor annealing. Solvent-vapor annealing with weakly hydrogen-bonding solvents having large molar volumes preferentially yields the P21/c crystal structure of HBC. Annealing with solvent vapors having smaller molar volumes and stronger tendencies to hydrogen-bond coaxes HBC films to adopt a previously-unpublished crystal structure that is similar to that of the Pbcn structure. Elucidating the structures of HBC thin films when they are exposed to a myriad of solvent vapors has allowed us to produce a processing diagram, with which we have been able to predictively access different crystal structures for thin-film transistor applications.

Anna Hiszpanski
Chemical and Biological Engineering Department, Princeton University

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