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Influence of Molecular Shape on Molecular Orientation and Stability of Vapor-Deposited Organic Semiconductors DIANE M. WALTERS, NOAH D. JOHNSON, M. D. EDIGER, University of Wisconsin-Madison — Physical vapor deposition is commonly used to prepare active layers in organic electronics. Recently, it has been shown that molecular orientation and packing can be tuned by changing the substrate temperature during deposition, while still producing macroscopically homogeneous films. These amorphous materials can be highly anisotropic when prepared with low substrate temperatures, and they can exhibit exceptional kinetic stability; films retain their favorable packing when heated to high temperatures. Here, we study the influence of molecular shape on molecular orientation and stability. We investigate disc-shaped molecules, such as TCTA and m-MTDATA, nearly spherical molecules, such as Alq_3, and linear molecules covering a broad range of aspect ratios, such as p-TTP and BSB-Cz. Disc-shaped molecules have preferential horizontal orientation when deposited at low substrate temperatures, and their orientation can be tuned by changing the substrate temperature. Alq_3 forms stable, amorphous films that are optically isotropic when vapor deposited over a broad range of substrate temperatures. This work may guide the choice of material and deposition conditions for vapor-deposited films used in organic electronics and allow for more efficient devices to be fabricated.

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