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Characterization of pi-conjugated oligopeptide superstructures created via continuous directed self assembly[1] LAWRENCE VALVERDE, CHARLES SCHROEDER, University of Illinois at Urbana-Champaign, WILLIAM WILSON, Harvard — Development of precise methods for controlling the nanoscale ordering of functional materials is a key challenge to achieving efficient and reliable organic semiconductor-based devices. In this work, we report a new continuous flow method for the directed assembly of oligopeptides with pi-conjugated cores based on tailored flow profile manipulation in microreactors. In particular, we implement 3-D flow focusing of oligopeptide streams combined with a planar extensional flow to achieve supramolecular assembly, alignment, and ordering. We characterize the assembly reaction in real-time using in situ confocal fluorescence microscopy and fluorescence lifetime imaging (FLIM). Through shifts in spectra and fluorescence lifetimes of accompany amyloid formation in oligopeptides with OPV3, 4T, or PDI cores, we demonstrate oligopeptide assembly in a 3D confined volume along the extensional flow axis. Moreover, we characterize assembled materials via the emerging technique of nano-Fourier transform infrared spectroscopy (nano-FTIR), which combines the molecular fingerprinting of traditional FTIR with the spatial resolution of atomic force microscopy (AFM). We further employ conductive probe AFM to characterize the optoelectronic properties of these materials.

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