

Abstract Submitted  
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**Chain morphologies in semi-crystalline polyfluorene: evidence from Raman scattering**<sup>1</sup> S. GUHA, C. VOLZ, M. ARIF, Department of Physics, University of Missouri-Columbia MO — Organic semiconductors, such as short-chain oligomers and long-chain polymers, are now a core constituent in numerous organic and organic-inorganic hybrid technologies. Polyfluorenes (PF) have emerged as attractive alternatives to other polymers due to their strong blue emission and high charge carrier mobilities. Almost all PF derivatives utilize side-chain substitution that improves solution processing and confers new functionality. There are many ambiguities regarding structure-property relationships in various side-chain substituted PFs. Di-octyl substituted PF (PF8) is known for its mesomorphic behavior, multitude of crystalline phases, and several conformational isomers that depend on the torsional angle between monomer units. In particular, the  $\beta$  phase that represents a more planar backbone conformation dominates the optical emission although it appears as a minority constituent. We present Raman scattering studies of PF8 as a function of thermal cycling, which establishes a connection between the conformational isomers and the side and main chain morphology. Density-functional calculations of the vibrational spectra of single chain oligomers in conjunction with the experimental results demonstrate the incompatibility of the  $\beta$  phase with the overall  $\alpha$  crystalline phase in PF8.

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