

Abstract Submitted
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Solution Structures of Poly(3-alkylthiophene)¹ KAIKUN YANG, LI-WEI HUANG, NARAYAN CH DAS, HOWARD WANG, State University of New York, Binghamton — Small angle neutron scattering has been used to understand the solution structure of regioregular and regiorandom alkyl-derived polythiophenes, with alkyl side groups varying from 4 to 10 carbons. While poly(3-octylethiophene) (P3OT) remain coil conformations in solution, poly(3-butylthiophene) (P3BT) and poly(3-dodecylthiophene) form gel networks. However, poly(3-hexylthiophene) (P3HT) forms rod-like aggregates over large length scales. At elevated temperatures, all structures dissolve to coil solutions. A temperature dependent study shows that the aggregates (coils, rods and gels) are thermally reversible. The solution structure is reflected in the morphology of as-prepared films cast from the same P3HT solution stored for various time. In general, roughness and large rod-like features in as-cast films increase with storage time. Those long 1D aggregates may form in solution and is responsible for the eventual gelation of P3HT solution, render it useless for casting films for applications.

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Howard Wang
State University of New York, Binghamton

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