

Abstract Submitted
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Structure and segmental dynamics in amorphous conjugated polymers¹ PENGFEI ZHAN, JANNA MARANAS, ENRIQUE GOMEZ, The Pennsylvania State University — Although it is well established that the microstructure strongly affects charge transport in organic semiconductors, the role of fluctuations of the structure on charge mobilities is still not well understood. We have examined the dynamics and structure in amorphous conjugated polymers poly(3-alkylthiophene)s (P3ATs) with neutron and x-ray scattering. We measured the segmental dynamics in amorphous P3ATs with quasi-elastic neutron scattering (QENS). The structure of amorphous P3ATs is measured with small-angle neutron scattering (SANS) and grazing incidence X-ray diffraction (GIXRD). Using SANS, we observe phase separation between the backbone and side-chains in all polymer samples for regiorandom P3ATs. Additionally, the analysis of the QENS data shows that longer side-chains relax faster compared with shorter side-chains and our further analysis of the elastic incoherent structure factor (EISF) suggests that the amplitude of proton motion on the thiophene rings increases by a factor of 3 as the side-chain length increases from 6 to 12, demonstrating that longer side chains lead to enhanced motion of conjugated rings.

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