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Quantifying tie-chain content in semicrystalline polyolefins with vapor-flow small-angle neutron scattering AMANDA MCDERMOTT, CHAD SNYDER, National Institute of Standards and Technology (NIST), PAUL DESLAURIERS, Chevron Phillips Chemical Company, RONALD JONES, National Institute of Standards and Technology (NIST) — Tie molecules bridging adjacent crystalline lamellae in semicrystalline polymers strongly impact mechanical properties, but they remain difficult to characterize. In this work we apply equilibrium swelling theory, balancing the entropic cost of tie-chain extension against the free energy of mixing, to small-angle neutron scattering patterns from semicrystalline polyethylene films whose interlamellar amorphous regions are swollen with deuterated organic solvent. Results show that for a linear polyethylene and several ethylene-hexene copolymers, these vapor-flow SANS measurements of tie-chain content compare favorably with a primary structural parameter (PSP2) that is calculated from molecular architecture and correlates with slow crack growth behavior.

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