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**Quantifying tie-molecule content in semicrystalline polymers**

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- Natl Inst of Stds Tech — Tie molecules bridging adjacent crystalline lamellae  
in semicrystalline polymers strongly impact mechanical properties, but they remain  
difficult to characterize. We demonstrate a new method of measuring tie-chain con-  
tent: applying equilibrium swelling theory to small-angle neutron scattering patterns  
from semicrystalline polyethylene films whose interlamellar amorphous regions are  
swollen with deuterated organic solvent in a vapor-flow sample environment. To  
aid in validating the measurement, measured tie-chain content is compared with a  
primary structural parameter (PSP2) that is calculated from molecular architecture  
and correlates with slow crack growth behavior. Agreement is favorable for a linear  
polyethylene and a series of ethylene-hexene copolymers. Recent applications of the  
technique are also discussed.

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