Polymers under Multiple Constraints

Polymer- & Soft-Matter-Seminar

Special Event, Wednesday 24th September 2014

at: **3.00** pm

VDP4 1.27, Von-Danckelmann-Platz 4, 06120 Halle

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"Chain-Folding Structure, Molecular Dimension, Structural Disorder, and Molecular Dynamics of Semi-crystalline Polymers as Elucidated by Solid-State NMR"

Semi-crystalline polymers are crystallized as folded chain structures in thin lamellae to form single plate/scrolled crystals in dilute solution and bilayer structures consisting of crystalline and amorphous regions in the bulk. Several advanced characterization tools have challenged understanding of polymer structures at different length scales. In this work, solid-state NMR spectroscopy is applied to extract detailed molecular level structures including chain trajectory and molecular dimensions, structural disorder, and molecular dynamics of semi-crystalline polymers. For example, Figure 1 shows 13C-13C Double Quantum (DQ) NMR analysis for chain-folding structure of isotactic-poly(1-butene) in melt grown crystals. Detailed structures such as adjacent re-entry fractions, re-entrance sites, and chain folding numbers are elucidated. On the basis of newly obtained molecular basis structures, crystallization mechanisms will be discussed.

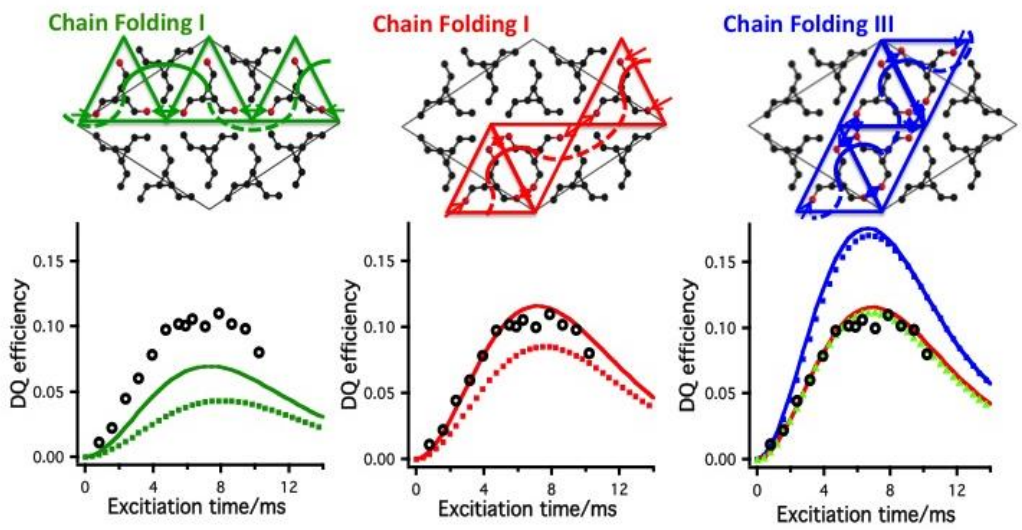

Figure 1. Experimental 13C-13C DQ NMR build-up curves of isotactic-poly(1-butene) crystals and simulated results based on various chain folding models.

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