Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Short-Range Helical Ordering of Isotactic Vinyl Polymers in the Liquid State[1] JOHN G. CURRO, Sandia National Laboratories, A. HABENSCHUSS, Oak Ridge National Laboratory, GUSTAVO A. CARRI, The University of Akron — Wide-angle x-ray scattering measurements on various vinyl polymer melts show that the main amorphous peak (at $k\sim 1.5\ A^{-1}$) in the structure factor initially broadens, and then forms a "pre-peak" that shifts to lower k as the size of the pendant group increases. To investigate this behavior we performed self-consistent PRISM calculations on isotactic polypropylene and polystyrene liquids. Good qualitative agreement was seen for the theoretical structure factors with scattering data. Analysis of the torsional angle distribution shows a significant amount of short-range helical content in the iPP and iPS melts. At 450^oK the average number of consecutive trans/gauche pairs along the chain backbone was significantly higher than for a random distribution of torsional angles. The theory indicates that the location of the pre-peak is a measure of the helix-helix correlation distance or helix "thickness".

[1] SNL is operated by Sandia Corporation, a Lockheed Martin Company for the U.S. DOE under Contract No. DE-AC04094AL85000. ORNL is operated by UT-Battelle, LLC, for the U.S. DOE under Contract DE-AC05-00OR22725.

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Date submitted: 28 Nov 2005

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