Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Partial Crystallinity in Alkyl Side Chain Polymers. VASAV SAHNI, SHISHIR PRASAD, JOHANNA VILLATE, ZHANG JIANG, SUNIL SINHA, ALI DHINOJWALA, THE UNIVERSITY OF AKRON COLLABORATION, UNIVERSITY OF CALIFORNIA, SAN DIEGO COLLABORATION — Surface freezing is the formation of a crystalline monolayer at the free surface of a melt at a temperature T_s, a few degrees above the bulk freezing temperature, T_b. This effect, $i.e. T_s > T_b$, common to many chain molecules, is in marked contrast with the surface melting effect, $i.e. T_s \leq T_b$, shown by almost all other materials. Various theoretical and experimental studies have been done to characterize the monolayer formed when the surface freezes before the bulk. We have studied the structure of a novel crystalline surface monolayer on top of a disordered melt of the same material (poly(n-alkyl acrylate)s) using grazing incidence x-ray diffraction. The grazing incidence x-ray diffraction, surface tension, and bulk latent heat results show that there is partial side-chain crystallinity. Also, the surface tension results explain the trend of the difference between the surface order-to-disorder transition temperature and the bulk melting temperature (ΔT) as a function of side chain length. The behavior of the crystal length, crystal spacing and tilt with varying alkyl chain length and temperature was also studied.

Ali Dhinojwala
University of Akron

Date submitted: 25 Nov 2008 Electronic form version 1.4