Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

AFM-TEM observations of effect of "melt" time on polytetrafluoroethylene morphology.[1] J.P. KALISH, R.A. WILLIAMS, J. WANG, P.H. GEIL, University of Illinois, T.-C. LONG, P. XU, W. L. Gore & Assocs., Inc. — TEM observations of PTFE dispersion particles dispersed on glass and held at 350 $^{\circ}$C or above for various times indicates that individual, $>$ 0.1 mm long molecules wander individually on the substrate and can, with time in the "melt," aggregate and form either flat-on or on-edge, folded chain single crystals. If "trapped" by cooling before aggregation, on-edge, single molecule, single crystals can form. All on-edge crystals, both individually and as the shish of shish-kebabs, have a "double-striation" appearance, suggested to arise from nucleation of the Pt/C shadowing material, used for the TEM image, on the folds at the top edge of the crystals.[2] AFM observations have confirmed these suggestions and, furthermore, indicate the nascent, rod-like dispersion particles of a "nano-emulsion," with a volume corresponding to a single molecule, have faceted ends. Combined with the TEM and ED observations that the molecular axis is parallel with the rod axis, not only must chain-folding occur during polymerization but the chain folds must be staggered on the end surfaces.

[1]This research was supported, in part, by the NSF Polymer Program. The TEM and AFM facilities used were supported, in part, by DOE through Grant DEFG02-91-ER45439.
[2]P. H. Geil, *et al.*, Adv. Polym. Sci., 180, 89 (2005).

Phillip Geil
University of Illinois

Date submitted: 29 Nov 2005 Electronic form version 1.4