Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Self-Assembly of Lamellar Microphases in Linear Gradient Copolymer Melts[1] NICHOLAS B. TITO, Dartmouth College, SCOTT T. MILNER, The Pennsylvania State University, JANE E. G. LIPSON, Dartmouth College — The ability to create 'designer copolymers' with tunable properties by tailoring their monomer composition has garnered recent interest in their molecular self-assembly. Here we investigate lamellar microphases in linear gradient binary copolymer melts using a variety of techniques, including solutions of self-consistent field equations, scaling theory, and analysis of the strong-segregation limit. The Flory scaling theory predicts the scaling of the equilibrium lamellar width L_{eq} as a function of comonomer incompatibility as characterized by χ. From the strongly segregated limit there are conformational fluctuations, and it is the tradeoff between the entropic effect of these relative to repulsive comonomer interactions that determines L_{eq}. We discover that $L_{eq}\ /R_g \sim (\chi N)^{1/6}$; remarkably, this is the same result as for symmetric diblock copolymers, although for quite different physical reasons.

[1]Work supported by the National Science Foundation and the Petroleum Research Fund.

Nicholas B. Tito
Dartmouth College

Date submitted: 18 Nov 2010 Electronic form version 1.4