Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Electric Field Effects in a Polarizable Model of Diblock Copolymer Melts[1] JONATHAN MARTIN, KRIS DELANEY, GLENN FREDRICKSON, Univ of California - Santa Barbara — We present a new molecularly-informed statistical field theory model of inhomogeneous polarizable soft matter. Using a Drude oscillator model, we construct polarizable, and optionally charged, molecular units. Within this field theory, models containing an arbitrary number of small-molecule or polymeric components can be constructed. This framework is amenable to a number of theoretical techniques, including analysis within the Gaussian fluctuation approximation and fully-fluctuating field-theoretic simulation. We construct a diblock copolymer melt within the proposed framework, distinguishing 'A' and 'B' monomers only by their respective polarizabilities. Using the former analytical methodology, we demonstrate that electrostatic fluctuations can induce phase separation for monomers of contrasting polarizability. We subsequently apply the latter numerical technique to investigate the order-disorder transition of a block copolymer melt experiencing an externally-applied electric field, and we consider the role of coupled electrostatic and compositional fluctuations therein.

[1]NSF DMR, ICB - Army Research Lab

Jonathan Martin
Univ of California - Santa Barbara

Date submitted: 11 Nov 2016 Electronic form version 1.4