Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Azobenzene Crystal Shooting and Shape Behavior in the Context of Time Dependent Ginzburg-Landau Equations[1] THOMAS SUTTER, Polymer Engineering, University of Akron, GRANG RILEY, Physics Department, Miami University, DMITRY GOLOVATY, Theoretical and Applied Mathematics, University of Akron, THEIN KYU, Polymer Engineering, University of Akron — Blends of azobenzene chromophore and diacrylate monomer show novel nucleation instability. Once a crystal nucleates near a larger growing crystal, it shoots away from the growing front. This shooting phenomenon is explained in the context of "Marangoni propulsion," an imbalance of surface energies at the leading and trailing crystal edges. A concentration gradient is established during the course of diffusion-controlled crystal growth; as the crystal front pulls azobenzene molecules in and rejects acrylate solvent molecules. Thus, crystal growth dynamics influence the concentration gradient build up at the advancing front, as well as the crystal's shape. The time dependent Ginzburg-Landau model C equation was used to simulate crystal growth using a free energy expression which combines Flory-Huggins theory of liquid-liquid demixing and the phase field free energy of crystallization. We have also established a theoretical phase diagram by self-consistently solving the free energy expression. Crystal shape and shooting character will be explained in the context of the phase diagram.

[1]We thank the donors of the American Chemical Society Petroleum Research Fund (PRF#48735-ND7).

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Date submitted: 03 Jan 2011 Electronic form version 1.4