Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Nonlinear Analysis of the Self-assembly of Nanostructures SHAOWEN HU, University of Houston, GIRISH NATHAN, GEMUNU GUNARATNE, DONALD KOURI — We investigate properties of a model of nanoscale pattern formation on a uniform substrate. The coefficients of the Ginzburg-Landau equations are concentration dependent. We find that, above the threshold, there are two branches of solutions corresponding to the up and down hexagonal structures; their appearance is related to the initial concentration of the system. The stability of such structures is confirmed by the analysis of the phase dynamics. When system is away from the threshold, the theory predicts a competition of stripe and hexagonal structures. The predicted stability domain of the stripe structures is consistent with numerical simulations. This provides a framework to understand the guided self-assembly technology, e.g., by the photolithography, at a coarse scale. The possible interaction of a large scale mode with the pattern mode is also discussed.

Shaowen Hu
University of Houston

Date submitted: 30 Nov 2005 Electronic form version 1.4