Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Reactive Multi-component Membranes: From Dynamic Reconstruction to Gradient Sensing OLGA KUKSENOK, ANNA C. BALAZS, University of Pittsburgh, Pittsburgh, PA, 15261 — Via computer simulations, we study two- and three-component membranes in which an external stimuli initiates a chemical reaction that inter-converts two of the components, A and B. The third component, C, is assumed to be non-reactive and is incompatible with the A and B. We also assume that the A and B have specified spontaneous curvatures. The dynamics of the system is described in terms of the three order parameters, two of which represent the composition and the third one is the height of the film. The binary (AB) part of our model is based on the recent model proposed by Reigada et al. (PRE 72,(2005) 051921); we have extended the latter approach by explicitly considering the effects of the lateral interfacial tension. By performing a linear stability analysis, we predict which state is realized for the given bending elasticity and interfacial tension of the membrane; the results of our computer simulations are in an agreement with the analytical calculations. For the three-component membrane, we illustrate how the presence of the non-reactive component affects the final patterns within the membrane. We also show how such multi-component "smart" membranes respond to changes in external stimuli and how they can be used to perform some simplified biomimetic functions, such as a gradient sensing.

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Date submitted: 17 Nov 2006 Electronic form version 1.4