Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Bilayer thickness mismatch controls domain size in biomimetic membranes FREDERICK A. HEBERLE, Oak Ridge National Laboratory, ROBIN S. PETRUZIELO, Cornell, JIANJUN PAN, PAUL DRAZBA, University of Tennessee, NORBERT KUČERKA, NRC, Canada, Comenius Univ., Slovakia, ROBERT F. STANDAERT, ORNL, Univ. of Tenn, GERALD W. FEIGENSON, Cornell, JOHN KATSARA, ORNL, Univ. of Tenn., NRC, Canada — In order to promote functionality, cells may alter the spatial organization of membrane lipids and proteins, including separation of liquid phases into distinct domains. In model membranes, domain size and morphology depend strongly on composition and temperature, but the physicochemical mechanisms controlling them are poorly understood. Theoretical work suggests a role for interfacial energy at domain boundaries, which may be driven in part by thickness mismatch between a domain and its surrounding bilayer. However, no direct evidence linking thickness mismatch to domain size in free-standing bilayers has been reported. We describe the use of Small Angle Neutron Scattering (SANS) to detect domains in simplified lipid-only models that mimic the composition of plasma membrane. We find that domain size is controlled by the degree of acyl chain unsaturation of low-melting temperature lipids, and that this size transition is correlated to changes in the thickness mismatch between coexisting liquid phases.

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Date submitted: 08 Jan 2013 Electronic form version 1.4