Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Estimation of Structural Properties Of The Thermally Fluctuated Membrane Based on The Small-Angle Neutron Scattering Data
TAKUMI HAWA, VICTOR LEE, The University of Oklahoma — SANS (Small-angle neutron scattering) and SAXS (Small-angle X-ray scattering) experiments are one of the most important laboratory techniques to determine nanoscale structure of biological and nanotechnology-related systems. These experimental techniques provide extensive information due to the sensitivity of about 1-1000 nm and 2-25 nm length scales for SANS and SAXS, respectively. Recently, the author and his collaborator, Dr. Nagao, studied swollen lamellar structure systems consisting of nonionic surfactant, water, and oil using SANS/NSE (Neutron Spin Echo) and MD (molecular dynamics) simulation. They proposed a new experimental technique to measure the thickness fluctuations of surfactant layers and verified their approach using MD simulations. In this talk we derive a simple mathematical model to estimate the thickness of the membrane as well as the amplitude and the wavelength of the surfactant layers in the membrane. The model is developed based on the harmonic motion of the surfactant layers. We consider both bending and thickness fluctuation motions of the membrane. The membrane thickness estimated from the proposed approach showed an excellent agreement with the SANS experimental results available in the literatures.

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Date submitted: 09 Nov 2012 Electronic form version 1.4