Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Compression-Induced Fusion of Glassy Core Polymer Micelles at the Air-Water Interface HYUN CHANG KIM, YOU-YEON WON, Purdue Univ — The surface mechanical and morphological properties of glassy core polymer micelles at the air-water interface were investigated. Asymmetric PS-PEG and PtBMA-PEG block copolymers with PEG weight fractions larger than 0.5 were formulated in the form of aqueous micelles and spread onto water. Compressed films of PS-PEG and PtBMA-PEG micelles reach high dynamic surface pressures. On the detailed level, however, PS-PEG and PtBMA-PEG micelles exhibit different surface pressure-area profiles. The PtBMA-PEG isotherm shows a transition to a plateau around a surface pressure of 24 mN/m, which is attributed to the PtBMA block as it forms a continuous film; this interpretation is supported by the fact that the surface pressure at the plateau transition is identical to the value of the spreading coefficient for PtBMA. This presents evidence that the core domains of PtBMA-PEG micelles melt and merge into a film when the micellar monolayer is laterally compressed. Such behavior was not observed with PS-PEG micelles. We suspect that under lateral compression, PtBMA-PEG micelles undergo fusion into a continuous film because PtBMA has the natural tendency to spread on the water surface, whereas PS-PEG micelles does not because the dewetting tendency of PS preventing formation of a uniform layer.

Hyun Chang Kim
Purdue Univ

Date submitted: 06 Nov 2015 Electronic form version 1.4