Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Influence of Molecular Size and Shape to Viscoelastic Properties of Polyethylene Glycol (PEG) Solution Boundary Layers PING WANG, SHENG QIN, XIANBIN DU, University of Science and Technology of China, DAMING ZHU, University of Missouri at Kansas City, UNIVERSITY OF SCIENCE AND TECHNOLOGY OF CHINA TEAM, UNIVERSITY OF MISSOURI AT KANSAS CITY TEAM — Viscosity and shear modulus of polyethylene glycol (PEG) solution boundary layers with different molecular weights and shapes were studied using a quartz crystal (coated with Au) resonator technique. Based on the resonant frequency shift and the dissipation broadening of the quartz crystal resonator, the viscosity and shear modulus of the solution boundary layers near the solution-Au interface as a function of the concentration and molecular weight of PEG molecules were determined. The results show that near the semidilute concentration, the viscosity of the boundary layer increases rapidly following a power law with an exponent that depends on the molecular weight of PEG molecules. For solutions with small PEGs, the viscosity increases of the boundary layers are similar to that in bulk solutions; the shear modulus of the boundary layer remains negligible up to the highest concentration measured. However, for solutions with large PEGs, the increases in viscosity deviate from that of the corresponding bulk solutions, and the boundary layers display noticeable nonzero shear modulus at the higher concentrations. The implication of these results will be discussed.

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Date submitted: 26 Oct 2009 Electronic form version 1.4