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The Effect of Nanoscopic Bubbles on the Viscosity of Fluids at a Solid-Liquid Interface JONATHAN M. JONES, Appalachian State University — It has been suggested that gaseous nanobubbles formed at solid-fluid interfaces may be responsible for a reduced interfacial viscosity at those surface boundaries. Here, we present measurements of the changing interfacial viscosity using both hydrophilic (Au, and SiO2) and hydrophobic (octadecanethiol self assembled monolayers (SAMs) on Au) at the interface of a coated gold electrode submerged in seltzer water, sonicated DI water, and DI water distilled in a vacuum chamber. We monitor changes in the resonant frequency of our quartz oscillator, and from the frequency measurements we can determine the viscosity. By acquiring movies of bubble formation on the QCM surface in seltzer water and correlating these movies with the measurements of the QCM frequency, we see that the measured viscosity of the seltzer water is decreased due to the presence of bubbles on the gold electrode. As the seltzer water goes flat with increasing time, the measured viscosity increases, approaching the viscosity of water as expected. We suggest similar behavior occurs with nanobubbles, and present data for DI water which has been distilled to varying degrees. On the hydrophobic surfaces, the bubbles form more readily, which results in a reduced interfacial viscosity as compared to the hydrophilic surfaces.

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