

Abstract Submitted  
for the MAR06 Meeting of  
The American Physical Society

**Rheology of sub-nanometer thick water films** TAI-DE LI, ROBERT SZOSZKIEWICZ, ELISA RIEDO, SCHOOL OF PHYSICS, GEORGIA INSTITUTE OF TECHNOLOGY TEAM — Knowing the behavior of water in small volumes is essential for the understanding of many processes in biology, tribology, and geophysics. Water under nano-confinement plays a crucial role in biological and technological systems. Here, we report an experiment in which an atomic force microscope tip approaches a flat solid surface in purified water, while small lateral oscillations are applied to the tip. The normal and lateral forces acting on the tip are measured directly and simultaneously as a function of water thickness. We find that, for hydrophilic surfaces, oscillatory solvation forces are present in the last four adjacent water layers where the dynamic viscosity is measured to grow up orders of magnitude in respect to bulk water. The same effects are present for atomically smooth surfaces and slightly rough surfaces. Oscillatory solvation forces have been detected also when the confining flat surface was hydrophobic.

Tai-De Li

Date submitted: 29 Nov 2005

Electronic form version 1.4