Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Nanomechanical measurements of ionic effect on nanoconfined water EDWARD KRAMKOWSKI, Wayne State University, SHAH KHAN, University of Peshawar, PETER HOFFMANN, Wayne State University — The behavior of liquid molecules confined to nanometer-scale spaces is a topic of particular interest to a variety of fields. From lab-on-a-chip medical device manufacturers to petroleum engineers involved in oil recovery, a wide range of researchers could benefit from a better understanding of the mechanics of nanoconfined liquids. Previous research has shown that above a critical strain rate, a confined liquid exhibits a solid-like response that oscillates with a period roughly equal to the molecular diameter of the liquid being observed. This indicates that when a liquid is compressed at a rate faster than the molecules can diffuse in bulk out from between the confining surfaces, it dynamically solidifies into an anisotropic layered liquid. In order to better understand the influence that the confining surfaces have on this behavior, we have been observing how the addition of different classes of ions at varying concentrations to a pure water sample either enhance or suppress the natural tendency of the water to order. The work indicates that an ion's effect on the liquid's structure is commensurate with its classification according to the Hofmeister series, with the amount of deviation from the pure behavior governed by the ionic concentration.

Edward Kramkowski
Wayne State University

Date submitted: 14 Nov 2014 Electronic form version 1.4