Simultaneous shear and normal stiffness measurements of a nanoconfined liquid

MIRCEA PANTEA, GEORGE MATEI, Wayne State University, SHIVA PATIL, University of Madrid, PETER HOFFMANN, Wayne State University — The nanomechanical behavior of nanoconfined liquids is of great interest in nanotribology, cellular biology and in the development of nanomechanical devices. In our lab, we have developed methods to measure the stiffness and damping in liquid films that are confined to the thickness of only a few molecular layers using a specially designed Atomic Force Microscope. By using two lock-in amplifiers together with a simple compensation circuit we are able to completely separate normal and shear stiffness and measure the two simultaneously as the tip is moved through the film, molecular layer by molecular layer. We will present our technique, the relevant theory and selected results on TEHOS, a model silicone oil.

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