Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Rheological Measurements by AFM of the Formation of Polymer Nanofibers MEHDI YAZDANPANAH, MAHDI HOSSEINI, SANTOSH PABBA, electroOptics Research Institute and Nanotechnology Center University of Louisville, SCOTT BERRY, VLADIMIR DOBROKHOTOV, ABDELILAH SAFIR, ROBERT KEYNTON, ROBERT COHN, electroOptics Research Institute and Nanotechnology Center University of Louisville, ELECTROOPTICS RESEARCH INSTITUTE AND NANOTECHNOLOGY CENTER UNIVERSITY OF LOUISVILLE COLLABORATION, DEPARTMENT OF MECHANICAL ENGINEERING COLLABORATION — Polymer fiber can be formed by pulling a thread of polymeric liquid if the fiber solidifies before it breaks up by capillary thinning. Fiber diameter is well correlated with a processing parameter that is a simple function of viscosity, surface tension and evaporation rate. The fundamental material parameters can also be determined with the same AFM setup. The usual problem with tapered AFM tips, of liquids wetting unstably up the tapered AFM tip and even onto the cantilever, is resolved by the use of long cylindrical tips of constant diameter. We recently demonstrated a method of growing Ag-Ga nanowires onto AFM tips at room temperature. These constant diameter nanowires are shown to give clearly measurable force-distance curves when inserted through the surface of a liquid, which provides clean measurements of surface tension, contact angle, and evaporation rate, while shear viscosity is determined through cantilever Q-damping as a function of insertion distance into the liquid.

Mehdi Yazdanpanah
electroOptics Research Institute and
Nanotechnology Center University of Louisville

Date submitted: 05 Dec 2007 Electronic form version 1.4