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Velocity Dependency of Dragging Force and Wetting Properties of High Viscous Liquids Using Constant Diameter Nanoneedle-Tipped AFM Probes. MEHDI YAZDANPANAH, ElectroOptics Research Institute and Nanotechnology Center, University of Louisville , MAHDI HOSSEINI, SANTOSH PABBA, CHARLES WALTER, JAYAN HEWAPARAKRAMA, ROBERT COHN, ELECTROOPTICS RESEARCH INSTITUTE AND NANOTECHNOLOGY CENTER, UNIVERSITY OF LOUISVILLE TEAM — A high aspect ratio and constant diameter Ag_2Ga nanoneedle grown on an AFM cantilever was used to perform F-D experiments on four different molecular weights of PDMS surfaces. The needle is partially inserted into and retracted from the liquid surface in various scan speeds. The viscous drag force causes the cantilever to deflect and recorded as a function of vertical displacement of the needle for each scan speed. The viscosity of the liquid is calculated by fitting a model into experimental data. The results show that the viscosity has strong correlation with the scan speed. Due to simple geometry of the needles, F-D curves are also interpreted to study the wetting properties (i.e. dynamic contact angle, meniscus height) of the PDMS at different scan speeds. Also, F-D curves are interpreted for polymer fiber formation during the capillary thinning and meniscus stretching that shown a strong correlation between the fiber length and the stretching velocity.

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