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Temperature Dependence of Single-Asperity Friction for Diamond on Diamond and DLC Interfaces[1] C. DUNCKLE, University of California, Irvine, I.B. ALTFEDER, Air Force Research Laboratory, P. TABOREK, University of California, Irvine — A variable temperature, ultrahigh vacuum atomic force microscope with a diamond-coated probe was used to characterize interfacial friction over a temperature range of 30 to 300 Kelvin. A vertical scan was used to measure tip to surface adhesion and contact normal forces. Friction (lateral) force measurements were taken by dragging the tip along the surface. Calibration was done in situ using substrates with known dimensions and angles. Measurements were made on diamond-like carbon surface and a single crystallite in a micro crystalline diamond film. Results were analyzed by fitting into the DMT continuum model. Comparison of friction versus load showed approximately a factor of two increase in the friction at cryogenic temperatures compared to room temperature. Results are qualitatively consistent with MD simulations but are not well described by models of thermally activated friction. Problems associated with temperature gradients at the tip- surface interface will be discussed.

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