Abstract Submitted
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Nanotribological properties of water films adsorbing atop, and absorbing below, graphene layers supported by metal substrates[1] ZIJIAN LIU, C.K. CURTIS, North Carolina State University, R. STINE, P. SHEEHAN, Naval Research Laboratory, J. KRIM, North Carolina State University — The tribological properties of graphite, a common lubricant with known sensitivity to the presence of water, have been studied extensively at the macroscopic and microscopic scales. Although far less attention has been devoted to the tribological properties of graphene, it has been established that the tribological response to the presence of water is dissimilar from that of graphite.[1] We report here a quartz crystal microbalance study of the nanotribological properties of water films adsorbed/absorbed on graphene layers prepared by either chemical decomposition on nickel(111) substrates or transfer of freestanding graphene layers to aluminum substrates. Sliding friction levels of the water films were also measured for metal surfaces in the absence of a graphene layer. We observe very high friction levels for water adsorbed atop graphene on Ni(111) and very low levels for water on aluminum. For the case of graphene/aluminum, the data indicate that the water is absorbing between the graphene layer and the aluminum. Dissipation levels moreover indicate the presence of an interstitial water increases sliding friction between the graphene and the aluminum substrate. [1] D. Berman et al., Materials Today 17, 31 (2014)

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