Abstract Submitted
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Nanodroplet Depinning Dynamics of from Nanoparticles[1] FONG YEW LEONG, A*STAR Institute of High Performance Computing, LIU QI, ZAINUL AABDIN, UTKARSH ANAND, National University of Singapore, TRAN SI BUI QUANG, A*STAR Institute of High Performance Computing, UTKUR MIRSAIDOV, National University of Singapore, NRF CRP COLLABORATION — Nanoscale defects on substrate affect the sliding motion of water nanodroplets. Using in situ TEM imaging, we visualized the depinning dynamics of water nanodroplets from gold nanoparticles on a flat SiNx surfaces. Our observations showed that nanoscale pinning effects of the gold nanoparticle opposes the lateral forces, resulting in stretching, even breakup, of the water nanodroplet. Using continuum long wave theory, we modelled the dynamics of a nanodroplet depinning from a nanoparticle of comparable length scales, and the model results are consistent with experimental findings. In particular, the critical depinning force for a ten-nanometer particle is found to be on the order of a nano-Newton, and the apparent viscosity of interfacial water is inferred to be several orders of magnitude greater than bulk values. Our findings have important implications on surface cleaning at the nanoscale.

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