Abstract Submitted
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Transition from superlubrically sliding islands to pinned monolayer, demonstrated in Xe/Cu(111) (*)[1] ROBERTO GUERRA, International School for Advanced Studies (SISSA), Via Bonomea 265, 34136 Trieste, Italy., ANDREA VANOSSI, CNR-IOM Democritos National Simulation Center, Via Bonomea 265, 34136 Trieste, Italy., ERIO TOSATTI, International School for Advanced Studies (SISSA), Via Bonomea 265, 34136 Trieste, Italy., TRIESTE NANOFRICTION TEAM — A molecular dynamics simulation case study of Xe on Cu(111) reveals unexpected information on the exceptionally smooth sliding state associated with incommensurate superlubricity which is argued to emerge in the large size limit of naturally incommensurate Xe islands. As coverage approaches a full monolayer, theory predicts an abrupt adhesion-driven two-dimensional density compression on the order of several per cent, implying a hysteretic jump from superlubric free islands to a pressurized sqrt()x sqrt()commensurate (and pinned, and therefore immobile) monolayer. These results match with recent quartz crystal microbalance data which show remarkably large slip times with increasing submonolayer coverage, signalling superlubricity, followed by a dramatic drop to zero for the dense commensurate monolayer [1]. Careful analysis of this variety of island sliding phenomena should be essential in future applications of friction at crystal/adsorbate interfaces. (*) Matching experimental work by M. Pierno, L. Bruschi, G. Mistura, G. Paolicelli, A. di Bona, S. Valeri. [1] M. Pierno, L. Bruschi, G. Mistura, G. Paolicelli, A. di Bona, S.Valeri, R. Guerra, A. Vanossi, E.Tosatti, Nature Nanotechnology 10, 714 (2015).

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