Abstract Submitted
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Layering-induced Superlubricity: Gold on Graphite[1] ANDREA VANOSSI, CNR-IOM Democritos National Simulation Center, Via Bonomea 265, 34136 Trieste, Italy, ROBERTO GUERRA, ERIO TOSATTI, International School for Advanced Studies (SISSA), Via Bonomea 265, 34136 Trieste, Italy, NANOFRICTION GROUP SISSA TEAM — By means of realistic MD simulations, we explore the static friction trend as a function of the true contact area and the model dimensionality for 2D gold nanoislands and 3D gold nanoclusters deposited on graphite, interesting tribological systems whose slow and fast dynamics have been previously investigated [1]. For increasing island size, because of the relative gold-graphite lattice mismatch, the interface stress energy has the chance to pile up by forming frustrated unmatched (i.e., incommensurate) regions and to develop a continuous solitonic pathway, foreshadowing a possible condition for the occurrence of ultralow friction regimes. The significant reduction of the depinning threshold, towards superlubricity, with the system dimensionality can be ascribed to a layering-induced effective stiffness of the interface contact, favoring the natural Au-C lattice incommensurability.

[1] R. Guerra, U. Tartaglino, A. Vanossi, and E. Tosatti, Nature Materials 9, 634 (2010).

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