

Abstract Submitted
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Understanding frictional duality and bi-duality: Sb-nanoparticles on HOPG¹ JAN BRNDIAR, ROBERT TURANSKY, IVAN STICH, Inst. of Physics, Slovak Academy of Sciences, Bratislava, Slovakia — We have simulated [1] the behavior of motion of Sb_n nanoparticles on HOPG with the quest to elucidate the experimentally observed frictional bi-duality [2]. The first duality was observed for clean Sb-nanoparticles deposited under UHV conditions. Both frictionless and “normal” behavior was observed. Another dual behavior was found for Sb-nanoparticles exposed to ambient conditions, both scaling linearly with contact area. The vanishing friction branch is due to incommensurability of the Sb-HOPG. The non-vanishing friction branch can be accounted for by contaminants due to imperfect UHV, such as water, hydrocarbons, oxygen, etc., including small Sb_n clusters. The large friction forces after exposition to ambient conditions result from presence of mobile oxidized multiasperities. The simulations allow for quantitative estimates of impurity concentrations and understanding of the molecular mobility.

[1] J. Brndiar et al. submitted (2010).

[2] D. Dietzel et al. Phys.Rev.Lett. **101**, 125505 (2008), Phys.Rev. **B 82**, 035401 (2010).

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