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Relating structure and friction: Energy dissipation during the lateral manipulation of antimony nanoparticles U.D. SCHWARZ, Dept. of Mechanical Engineering, Yale University, C. RITTER, Institute of Chemistry, Humboldt University Berlin, M. HEYDE, Fritz-Haber Institute of the Max-Planck-Society, Berlin, K. RADEMANN, Institute of Chemistry, Humboldt University Berlin — Despite its daily-life importance, the fundamentals of friction are still insufficiently understood. In particular, the interplay between friction, "true" contact area, and crystalline structure at the interface is an issue of current debate. Recently, a new technique had been introduced that allows determining the threshold energy dissipated during the lateral displacement of small nanoparticles on suitable substrates as a function of the particle-substrate contact area [Ritter et al., PRB **71**, 085405 (2005)]. Here, we present results of an extensive study of antimony nanoparticles 1000 nm^2 to 100000 nm^2 in size moved in air on graphite substrates. Complementary studies by electron microscopy reveal the internal structure of the islands, showing a transition from amorphous to crystalline of the island's cores at about 10000-15000 nm^2 size, while the surface layers are composed of amorphous antimony oxide in all cases. However, despite the similarities of the amorphous surface layer, islands with crystalline core show significantly higher energy dissipation during motion than the ones with amorphous core. Possible reasons for this effect are discussed.

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