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Peculiarities of sliding friction in graphene, graphene fluoride, graphite: Comparison of experiment with atomistic simulations LIUDMYLA BARABANOVA, JEFFREY MCCAUSLAND, ALPER BULDUM, SERGEI LYUKSYUTOV, University of Akron — Friction is the major source of energy dissipation at the nanoscale. We use atomic force microscopy (AFM) to study slide friction based on analysis of trace-minus-retrace (TMR) signals. To obtain the signals a directional dependence of the sliding friction using a rotational technique was used at the edges and interiors of the samples graphene (G), graphene fluoride (GF), and graphite. The friction coefficient experimental results were based on a methodology assuming orthotropic friction and found to be in the range of 10^{-3} to 10^{-1} over all samples. Supplementing experimental measurements, we also performed atomistic modeling and simulations to investigate tribological properties of G including the edges. Molecular dynamics simulations and geometry optimization calculations were carried and compared with experimental measurements. It is suggested that the atoms at the apex of the asperities and at the graphene edges have important effect on friction.

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