Frictional Energy Dissipation of Polycrystalline van der Waals Material

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Against conventional wisdom, corrugated grain boundaries in polycrystalline graphene, grown on Pt(111) surfaces, are shown to exhibit negative friction coefficients and non-monotonic dependence. Using combined experimental, simulation, and modeling efforts, the underlying energy dissipation mechanism is found to be dominated by dynamic buckling of grain boundary dislocation protrusions. The revealed mechanism is expected to appear in a wide range of polycrystalline two-dimensional material interfaces, thus supporting the design of large-scale dry superlubric contacts [1].

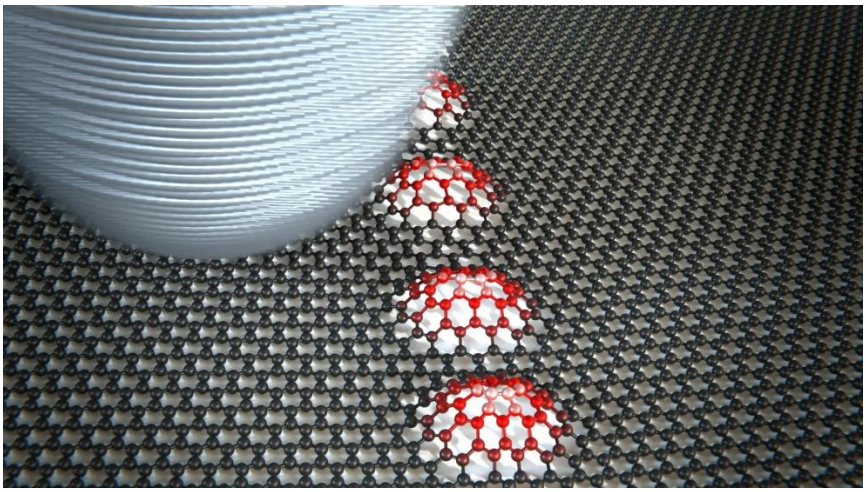

Figure 1. Illustration of an AFM tip sliding over a corrugated graphene grain boundary.

Reference

[1] Y. Song, et al. Nat. Commun. **15**, 9487 (2024).