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Interlayer binding energy of graphite: A mesoscopic determination from deformation[1] ZHE LIU, Department of Mechanical and Aerospace Engineering, Monash University, VIC 3800, Australia, ZE LIU, QUANSHUI ZHENG, Department of Engineering Mechanics and Center for Nano and Micro Mechanics, Tsinghua University, Beijing 100084, China, COMPUTATIONAL MATERIALS SCIENCE COLLABORATION, CENTER FOR NANO AND MICRO MECHANICS COLLABORATION — Despite the interlayer binding energy (BE) being one of the most important material properties of graphite, direct experimental determination is yet to be reported. In this talk, we present a novel experimental method to directly measure the interlayer BE of HOPG. By employing the self-retraction motion of a graphite flake in a graphite island (Phys. Rev. Lett. 100, 067205 (2008)), we assembled a graphite top flake spanning a graphite step, yielding a contact area ($\sim \mu m^2$) with a graphite platform. STM scan showed that the interface was atomically smooth. The deformation of the top flake should be determined by the BE with the graphite platform. Thus using a finite element model to simulate the top-flake height profiles measured by AFM, we determine the graphite BE as $0.19(\pm 0.01) J/m^2$, which can serve as a benchmark for other theoretical and experimental works. Our proposed method can be easily extended to measure the BEs between graphite/graphene and other types of substrates. It can also be used in other systems, particularly lamellar materials and thin films.

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