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Corrugation and energetics of graphene on SiO_2[1] WILLIAM CULLEN, MAHITO YAMAMOTO, KRISTEN BURSON, JIANHAO CHEN, ELLEN WILLIAMS, MICHAEL FUHRER, University of Maryland — Measurements of the topographic structure of graphene on SiO_2 are seen to vary considerably between different published reports, particularly with respect to the amplitude of corrugation observed at the few-nm length scale. Intrinsic rippling of the graphene has been reported, in addition to evidence of tip interaction effects. In spite of recent high-resolution STM measurements of exfoliated graphene by several groups, the structure of graphene on SiO_2 remains controversial, necessitating a better understanding of the interaction between graphene and the substrate, and clarification of assumptions of equilibrium in assessing the structure. Our measurements incorporate a unique combination of UHV high-resolution non-contact AFM and STM to characterize both the graphene and the underlying SiO_2 substrate. We measure monolayer and few-layer graphene with complementary STM and NC-AFM, and assess the observed structures in terms of the energy balance between elastic energy of the graphene membrane and adhesion energy of the substrate.

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