Abstract Submitted
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Wrinkling of graphene membranes supported by silica nanoparticles on substrates[1] MAHITO YAMAMOTO, WILLIAM CULLEN, MICHAEL FUHRER, THEODORE EINSTEIN, Materials Research Science and Engineering Center and Center for Nanophysics and Advanced Materials, Department of Physics, University of Maryland, DEPARTMENT OF PHYSICS, UNIVERSITY OF MARYLAND TEAM — The challenging endeavor of modulating the morphology of graphene via a patterned substrate to produce a controlled deformation has great potential importance for strain engineering the electronic properties of graphene. An essential step in this direction is to understand the response of graphene to substrate features of known geometry. Here we employ silica nanoparticles with a diameter of 10-100 nm to uniformly decorate SiO_2 and mica substrates before depositing graphene, to promote nanoscale modulation of graphene geometry. The morphology of graphene on this modified substrate is then characterized by atomic force spectroscopy. We find that graphene on the substrate is locally raised by the supporting nanoparticles, and wrinkling propagates radially from the protrusions to form a ridge network which links the protrusions. We discuss the dependence of the wrinkled morphology on nanoparticle diameter and graphene thickness in terms of graphene elasticity and adhesion energy.

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