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Mechanical properties of graphene on deformable patterned substrates: Experimental studies S. SCHARFENBERG, C. CHIALVO, D.Z. ROCKLIN, R. WEAVER, P.M. GOLDBART, N. MASON, University of Illinois — The mechanical properties of graphene can strongly influence its electronic behavior, and are relevant for implementing novel nano-mechanical devices. In this talk we present results on the mechanical behavior of few-layered graphene (FLG) placed on a patterned rubbery surface. Samples of FLG, with thicknesses ranging from 1-7 atomic layers, were deposited on micro-scale grooved polydimethylsiloxane (PDMS) substrates. AFM imaging techniques were then used to study the surface deformations, and to perform thickness measurements on the samples. AFM phase-imaging shows that the graphene strongly adheres to the substrate. The graphene also substantially deforms the substrate, with thicker pieces causing greater deformation. The results are discussed in the context of a linear elasticity theory (detailed in an accompanying paper) which can be used to explain the data and place bounds on the various interface strengths.

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