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In-Situ Measurements of Graphene Mechanics During Annealing AARON HUI, ROBERTO DE ALBA, ABHILASH SEBASTIAN, JEEVAK PARPIA, Cornell University — Graphene shows great potential as a material for a new generation of mechanical nanodevices. However, current methodologies used for fabricating graphene structures involve polymer resists for transfer and patterning, which degrades mechanical performance. To improve surface quality, high current or high temperature annealing of graphene is commonly employed. Previous studies of graphene mechanics have focused on performance after annealing or temperature-dependent behavior from 4K-300K. Here we present real-time, in-situ measurements of graphene mechanical resonance during high temperature annealing from 300K-600K. Upon heating, reversible changes in mechanical frequency are indicative of graphene thermal contraction. Discontinuous and irreversible changes are also seen, corresponding to graphene slipping and mass desorption. Both reversible and irreversible changes in quality factor are also observed. Characterizing the effects of annealing on the structural properties of graphene will enable more precise engineering for particular applications, such as mass sensing.

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