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Graphene Calisthenics: Straintronics of Graphene with Light-Reactive Azobenzene Polymer KACEY MEAKER, PEIGEN CAO, MANDY HUO, MICHAEL CROMMIE, University of California, Berkeley — Although a promising target for next-generation electronics, graphene's lack of a band gap is a severe hindrance. There are many ways of opening a gap, and one controllable way is through application of specific non-uniform strains which can produce extremely large pseudomagnetic fields. This effect was predicted and verified experimentally, but so far there have been few methods developed that reliably control the size, location, separation and amount of strain in graphene. We have used a layer of light-reactive azobenzene polymer beneath the graphene to produce strained monolayer graphene with light exposure. Using Raman spectroscopy, we have measured a shift of up to 20 cm^{-1} in the 2D peak when the graphene and polymer sample was exposed to 532 nm laser illumination indicating that the graphene is undergoing a strain from deformation of the azobenzene layer below. AFM topographic measurements and COMSOL simulations were used to verify this assertion. Use of polymeric materials to reliably strain graphene in non-uniform ways could result in controllable production of large pseudomagnetic fields in graphene and more control over graphene's low-energy charge carriers.

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