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Graphene Calisthenics: Modeling the Polymer-induced Graphene Stretching for Next Generation Electronics MANDY HUO, KACEY MEAKER, SU-ANN CHONG, MICHAEL CROMMIE, University of California, Berkeley — Graphene is one atomic layer of graphite. It is stronger than steel yet very elastic. Although graphene is a semiconductor with no band gap, we can introduce a gap using various methods in order to make it useful in next-generation electronics. One way to do this is to strain graphene. While we can easily strain graphene uniaxially, this type of strain does not produce appreciable band gaps until relatively high strain percentages close to the fracture point of graphene. However, with a special strain geometry we can produce band gaps well before reaching the breaking point of graphene. This has been done experimentally, but not in a controlled manner. From previous research, strain percentages around 10 percent produce appreciable band gaps. Increasing the strain will increase the size of these gaps, but graphene breaks at around 20 percent strain. We propose to control the amount by which we strain graphene by placing it on a special polymer which expands when light is shone on it. In this project we use COMSOL, a finite element analysis software, to estimate the strain resulting in graphene due to stretching it with a given polymer geometry to find the shapes which will produce the specified strain.

Kacey Meaker
University of California, Berkeley

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