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Focused Ion Beam patterning of suspended graphene for cantilever and kirigami devices PETER ROSE, Laboratory of Atomic and Solid State Physics, Cornell University, PINSHANE HUANG, School of Applied and Engineering Physics, Cornell University, MELINA BLEES, ARTHUR BARNARD, Laboratory of Atomic and Solid State Physics, Cornell University, DAVID MULLER, School of Applied and Engineering Physics, Kavli Institute at Cornell for Nanoscale Science, Cornell University, PAUL MCEUEN, Laboratory of Atomic and Solid State Physics, Kavli Institute at Cornell for Nanoscale Science, Cornell University — We have developed techniques that use a Focused Ion Beam (FIB) to cut and manipulate suspended graphene. Using a dual-beam FIB, we can make cuts with a resolution of tens of nanometers, manipulate and pick up finished devices using a micromanipulator, and remove device and micromanipulator from the vacuum chamber. Remarkably, we have demonstrated that singly clamped graphene cantilevers can be fabricated reliably and are robust enough to be freely manipulated in air. This gives us the potential to perform novel electrostatic and mechanical measurements of graphene. Using the FIB's direct writing capabilities, we are also able to cut out more complex shapes, drawing inspiration from kirigami, the art of paper cutting. Using specific cuts, we can create soft in-plane springs, which might be used to study tension. This exploration of the fabrication and manipulation of graphene in three dimensions is a promising new avenue toward harnessing graphene's unique properties, and also holds promise for other 2D materials.

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