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Graphene Plasmo-Mechanical Structures and Devices PARINITA NENE, JARED STRAIT, WEIMIN CHAN, CHRISTINA MANOLATOU, PAUL MCEUEN, FARHAN RANA, Cornell Univ, CORNELL UNIVERSITY COLLABORATION — The manipulation of microstructures with optical forces has generated tremendous interest in recent years. In most cases, the light forces on a dielectric material are induced via the polarization of the medium. The idea of manipulating atomic membranes, like graphene, and related devices with light forces is extremely attractive. But graphene has a small dielectric constant represented by the imaginary part of the optical conductivity. In contrast, in graphene plasmonic structures, the real part of the conductivity is extremely large at the plasmon resonance frequencies. This large current response results in extremely large plasmonic forces between adjacent graphene plasmonic resonators under light illumination. The forces are a result of the charge density associated with the plasmon oscillations and can reach force density values larger than a micro-Newton/micron in plasmonic resonators, such as graphene strips and discs. These plasmonic forces can be tailored to be attractive or repulsive depending on the plasmon mode symmetries. We present results from theoretical and computational models for plasmonic forces, and show several examples of structures and devices that can be manipulated with plasmonic forces, and demonstrate that plasmo-mechanics can be a very effective tool in manipulating and transducing graphene micro- and nano-structures.

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