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Transfer-Free, Wafer-Scale Manufacturing of Graphene-Based Electromechanical Resonant Devices MICHAEL CULLINAN, JASON GORMAN, National Institute of Standards and Technology — Nanoelectromechanical (NEMS) resonators offer the potential to extend the limits of force and mass detection due to their small size, high natural frequencies and high Q-factors. Graphene-based NEMS resonators are particularly promising due to their high elastic modulus and atomic thickness. However, widespread use of graphene in such systems is limited by the way in which graphene-based devices are typically fabricated. Most graphene-based NEMS devices are fabricated in a "one-off" manner using slow, limited scale methods such as mechanical exfoliation, electron beam lithography, or transfer from copper foils which can't be incorporated into standard micro/nanofabrication lines. This talk will present a method that can be used to manufacture graphene-based NEMS devices at the wafer scale using conventional microfabrication techniques. In this method graphene is grown directly on thin film copper using chemical vapor deposition. The copper film is then patterned and etched to produce graphene-based NEMS resonators. This talk will also address some of the challenges in fabricating a large number of graphene devices at the wafer scale including achieving high uniformity across the wafer, increasing device-to-device repeatability, and producing high device yields.

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