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Detecting the Biopolymer Behavior of Graphene Nanoribbons in Aqueous Solution JINGQIANG LI, SITHARA WIJERATNE, EVGENI PENEV, WEI LU, AMANDA DUQUE, BORIS YAKOBSON, JAMES TOUR, CHING-HWA KIANG, Rice Univ, BORIS I.YAKOBSON GROUP TEAM, JAMES M.TOUR GROUP TEAM, CHING-HWA KIANG GROUP TEAM — Graphene nanoribbons (GNR), can be prepared in bulk quantities for large-area applications by reducing the product from the lengthwise oxidative unzipping of multiwalled carbon nanotubes (MWNT). Recently, the biomaterials application of GNR has been explored, for example, in the pore to be used for DNA sequencing. Therefore, understanding the polymer behavior of GNR in solution is essential in predicting GNR interaction with biomaterials. Here, we report experimental studies of the solutionbased mechanical properties of GNR and their parent products, graphene oxide nanoribbons (GONR). We used atomic force microscopy (AFM) to study their mechanical properties in solution and showed that GNR and GONR have similar force-extension behavior as in biopolymers such as proteins and DNA. The rigidity increases with reducing chemical functionalities. The similarities in rigidity and tunability between nanoribbons and biomolecules might enable the design and fabrication of GNR-biomimetic interfaces.

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