Abstract Submitted
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Hybrid graphene nanoribbon-nanopore devices for biomolecule detection and DNA sequencing[1] ADRIAN BALAN, MATTHEW PUSTER, JULIO ALEJANDRO RODRIGUEZ- MANZO, MARIJA DRNDIC, University of Pennsylvania, Department of Physics and Astronomy — We present a study of hybrid graphene nanoribbon-nanopore devices for biomolecule detection and ultimately DNA sequencing. We realized back or side gated devices comprised of nanopores(2−10 nm) at the edge or in the center of GNRs with widths of 5-200nm, on SiNx membranes. Electron beam-induced irradiation effects[1] are studied by in situ conductance measurements during nanopore formation inside a 200kV transmission electron microscope (TEM) for different doping levels. Bases on our findings we devise a scanning TEM procedure which prevent the GNR electron induced damage, enabling sensitive biosensors. We finally present the operation of this sensor for biomolecule detection and DNA sequencing. The higher current (μA) driven through a GNR compared to the ionic current(nA) in nanopore devices leads to a hundredfold increase in the measuring bandwidth(10-100MHz), possibly enabling DNA sequencing without slowing the molecules. [1] Towards sensitive graphene nanoribbon-nanopore devices by preventing electron beam induced damage. M. Puster, J. A. Rodriguez- Manzo, A. Balan, M. Drndic. ACS Nano,10.1021/nn405112m.

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