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New Approaches to Edge-Doping Graphene Nanoribbons DANIEL J. RIZZO, TOMAS MARANGONI, TING CAO, GIANG D. NGUYEN, HSIN-ZON TSAI, ARASH A. OMRANI, CHRISTOPHER BRONNER, TRINITY JOSHI, GRIFFIN F. RODGERS, WON-WOO CHOI, RYAN R. CLOKE, STEVEN G. LOUIE, FELIX R. FISCHER, MICHAEL F. CROMMIE, UC Berkeley, CROMMIE TEAM[1], FISCHER TEAM[2], LOUIE TEAM[3] — Graphene nanoribbons (GNRs) are narrow semiconducting strips of graphene that exhibit novel electronic and magnetic properties. New bottom-up fabrication techniques enable atomic-scale precision in GNR synthesis. The use of these techniques to reliably tune the position and size of GNR band gaps is an important challenge that also has relevance for the question of whether GNRs are viable for future nanotechnologies. We have used scanning tunneling microscopy (STM) and scanning tunneling spectroscopy (STS) to investigate how the geometry of heteroatom incorporation alters the electronic structure of bottom-up fabricated chevron-type GNRs. We find that the addition of nitrogen into the GNR edge via a five-membered ring yields a reduced band gap compared to the behavior of pristine, undoped chevron GNRs.

[1]Performed STM, STS, and nc-AFM measurements
[2]Performed organic synthesis of precursors and desgined precursors
[3]Performed calculations of electronic structure

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