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Evolution of Electronic Localization in Bottom-up Graphene Nanoribbon Heterojunctions DANIEL J. RIZZO, MENG WU, HSIN-ZON TSAI, TOMAS MARANGONI, ARASH A. OMRANI, GIANG D. NGUYEN, CHRISTOPHER BRONNER, TRINITY JOSHI, DANNY HABERER, RYAN R. CLOKE, FRANKLIN LIOU, MICHAEL F. CROMMIE, FELIX R. FISCHER, STEVEN G. LOUIE, UC Berkeley, CROMMIE TEAM[1], FISCHER TEAM[2], LOUIE TEAM[3] — Graphene nanoribbons (GNRs) are narrow semiconducting strips of graphene that are predicted to exhibit novel electronic and magnetic properties. Recent advances in bottom-up synthesis techniques have enabled atomically-precise control over GNR structure and dopant integration, thus allowing fabrication of a variety of different GNR heterojunctions. The ability to reliably fabricate and characterize GNR heterojunctions is a critical first step in the development of sophisticated future device architectures that incorporate bottom-up GNRs. Using scanning tunneling microscopy (STM) and spectroscopy (STS), we have investigated how GNR heterojunction band edge alignment evolves as a function of heterojunction length. We find that a minimum heterojunction length is required to observe electron localization to one side of the of GNR heterojunction interface, and that increased electronic localization is observed as the heterojunction length increases.

[1]Scanning Probe
[2]Synthesis/Scanning Probe
[3]Theory

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