

Abstract Submitted
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Chemically derived graphene nanoribbons: physical properties and electronics¹ XINRAN WANG, Stanford University, YIJIAN OUYANG, University of Florida, XIAOLIN LI, LI ZHANG, HAILIANG WANG, Stanford University, JING GUO, University of Florida, HONGJIE DAI, Stanford University — Graphene electronics is a promising field of graphene research due to extremely high carrier mobility and the ability to fabricate true nanometer scale devices. We show that sub-10nm graphene nanoribbons, which are semiconductors with suitable bandgap for nano-electronics, can be synthesized via chemistry. Electrical transport measurements show that GNRs have finite bandgaps which are inversely proportional to widths. Unlike carbon nanotubes, all the sub-10nm GNRs are semiconductors and afford graphene field-effect transistors (FETs) with on-off ratio higher than 10^5 at room temperature. The performance of individual GNR-FET is assessed and compared with CNT-FETs. The scattering mean free path of carriers in GNRs is estimated, and the limiting factors are discussed. The performance of chemical GNRs and plasma etched GNRs are also compared and discussed.

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