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Towards the assembly of structurally precise graphene nanoribbons for electronic applications JIA GAO, Department of Chemical and Biological Engineering, Princeton University, FERNANDO J. URIBE-ROMO, HASAN ARSLAN, COLIN CRICK, Department of Chemistry and Chemical Biology, Cornell University, JONATHAN D. SAATHOFF, PAULETTE CLANCY, School of Chemical and Biomolecular Engineering, Cornell University, WILLIAM R. DICHTEL, Department of Chemistry and Chemical Biology, Cornell University, YUEH-LIN LOO, Department of Chemical and Biological Engineering, Princeton University — Graphene's lack of band gap has been a bottleneck that limits its use in transistors. One promising approach to open up a gap in its band structure is to narrow the width of graphene, i.e., make "nanoribbons." Bottom-up synthesis is a most promising method to produce structurally precise nanoribbons. But the assembly and patterning of these nanoribbons remains a challenge. In this study, we demonstrate a method for the assembly of structurally precise graphene nanoribbons. We observe preferential adsorption of nanoribbons on gold surfaces as opposed to silicon dioxide surfaces with aerosol-assisted chemical vapor deposition. Importantly, we can tune the coverage of graphene nanoribbons through appropriate surface treatments. Graphene nanoribbon adsorption on a gold surface that had been modified with pentafluorobenzenethiol, for example, is higher than that on ozone-cleaned gold, as evidenced by higher D and G band intensities in its Raman spectra. The ability to tune the surface coverage through surface treatment provides a unique opportunity to assemble and pattern graphene nanoribbons for electronic applications.

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