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Atomically precise nitrogen-doped graphene nanoribbons[1]
ALEXANDER SINITSKII, University of Nebraska - Lincoln — There is a considerable interest in graphene nanoribbons (GNRs), few-nm-wide strips of graphene with high aspect ratios, because of their intriguing physical properties. For example, GNRs with zigzag edges are predicted to exhibit low-dimensional magnetism, while GNRs with armchair edges can possess large energy band gaps, making them promising materials for future electronics and photovoltaics. The ability to control structural parameters of GNRs, such as their width, edge structure and termination, with atomic precision is the key for practical realization of these intriguing nanoscale properties. Physical properties of GNRs can also be modified by their doping with heteroatoms, such nitrogen, resulting in nitrogen-doped GNRs or N-GNRs. In this talk I will demonstrate that large quantities of narrow atomically precise N-GNRs can be synthesized via Yamamoto coupling of molecular precursors containing nitrogen atoms followed by cyclodehydrogenation using Scholl reaction. Several types of N-GNRs with different doping levels have been synthesized and systematically studied by spectroscopic, microscopic and transport methods. Incorporation of nitrogen atoms in graphene lattice is shown to be an effective route to affect GNRs' band gap, doping level as well as aggregation behavior.

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