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Scanning tunneling microscopy of atomically precise graphene nanoribbons exfoliated onto H:Si(100) ADRIAN RADOCEA, University of Illinois at Urbana-Champaign, MOHAMMAD MEHDI POUR, TIMOTHY VO, MIKHAIL SHEKHIREV, ALEXANDER SINITSKII, University of Nebraska - Lincoln, JOSEPH LYDING, University of Illinois at Urbana-Champaign — Atomically precise graphene nanoribbons (GNRs) are promising materials for next generation transistors due to their well-controlled bandgaps and the high thermal conductivity of graphene. The solution synthesis of graphene nanoribbons offers a pathway towards scalable manufacturing. While scanning tunneling microscopy (STM) can access size scales required for characterization, solvent residue increases experimental difficulty and precludes band-gap determination via scanning tunneling spectroscopy (STS). Our work addresses this challenge through a dry contact transfer method that cleanly transfers solution-synthesized GNRs onto H:Si(100) under UHV using a fiberglass applicator. The semiconducting silicon surface avoids problems with image charge screening enabling intrinsic bandgap measurements. We characterize the nanoribbons using STM and STS. For chevron GNRs, we find a 1.6 eV bandgap, in agreement with computational modeling, and map the electronic structure spatially with detailed spectra lines and current imaging tunneling spectroscopy. Mapping the electronic structure of graphene nanoribbons is an important step towards taking advantage of the ability to form atomically precise nanoribbons and finely tune their properties.

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