

Morphological characterization and electronic properties of pristine and oxygen-exposed graphene nanoribbons on Ag(110)

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Graphene nanoribbons (GNRs) are at the frontier of research on graphene materials since the 1D quantum confinement of electrons allows for the opening of an energy gap [1]. GNRs of uniform and well-defined size and shape can be grown using the bottom-up approach, i.e. by surface assisted polymerization of aromatic hydrocarbons [2]. Since the electronic properties of the nanostructures depend on their width and on their edge states, by careful choice of the precursor molecule it is possible to design GNRs with tailored properties [3]. Here, we characterize pristine and oxygen-exposed GNRs with mixed edge-site sequence (two zig-zag and one armchair) synthesized on Ag(110) from 1,6-dibromo-pyrene precursors. The electronic structure is investigated by scanning tunneling spectroscopy, and influence of oxygen exposure is revealed by scanning tunneling microscopy and photoemission spectroscopy. Our results demonstrate that oxygen exposure deeply affects the overall system by interacting both with the nanoribbons and with the substrate; this factor must be considered for supported GNRs under operative conditions.

References:

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