Bottom-up fabrication of graphene-related materials: From molecules to nanoribbons and nanotubes

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The properties of single-walled carbon nanotubes (SWCNT) and graphene nanoribbons (GNR) depend sensitively on the details of their atomic structure. For the case of SWCNTs, electronic and optical properties are directly related to the chiral index (*n*,*m*) that denotes the length and orientation of the circumferential vector in the hexagonal carbon lattice. For GNRs, the electronic states largely depend on nanoribbon width and edge structure (armchair or zigzag). Monodisperse "single-chirality" SWCNTs and atomically precise GNRs are thus needed to fully exploit the technological potential of these materials.
In a first part of this presentation, I will review a recently developed bottom-up approach to the fabrication of atomically precise GNRs [1]. It is based on a surface-assisted synthetic route using specifically designed precursor monomers, and has made available ultra-narrow GNRs and related graphene nanostructures for experimental investigations of their structural, electronic and optical properties [1-5]. In a second part, I will report on a closely related bottom-up strategy targeting the controlled synthesis of single-chirality SWCNTs [6].

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