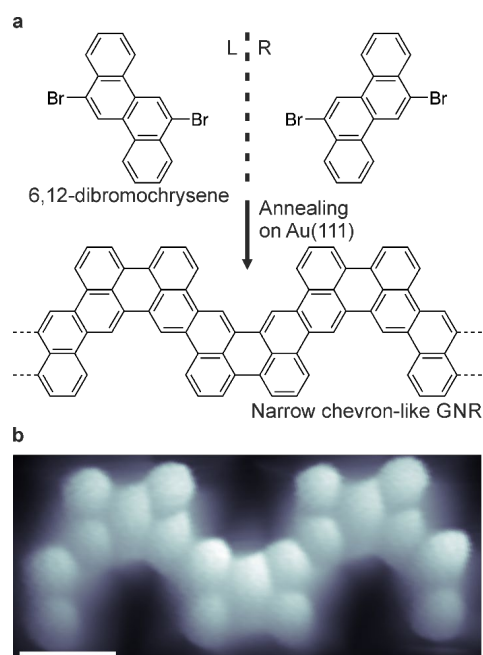


# Low dimensional molecular nanostructures on (non-)interacting substrates

M. Stöhr<sup>1</sup>

<sup>1</sup> *Zernike Institute for Advanced Materials, University of Groningen, 9747 AG Groningen, The Netherlands*

Control over graphene's electronic properties is a prerequisite for facilitating the implementation of graphene in future electronic devices. One way to adjust the electronic properties of graphene is spatial confinement of its charge carriers in a 1D structure, so called graphene nanoribbons (GNRs). One recently established route, which also offers flexibility over the structural properties, to create GNRs is on-surface synthesis. [1] In previous work, we fabricated narrow chevron-like GNRs on Au(111) from the prochiral molecular precursor 6,12-dibromochrysenes (DBCh) based on enantiomer-selective Ullmann-type coupling and subsequent thermally induced cyclodehydrogenation (Figure 1a). [2] In addition to the structural characterization of these GNRs by scanning tunneling microscopy (STM) (Figure 1b), we also studied their electronic properties using scanning tunneling spectroscopy, also in dependence of their length and spatial symmetry. [3] Furthermore, we observed different coupling defects resulting in bent GNRs which are based on the formation of both a five- and six-membered carbon ring. This results in the formation of a molecular heterojunction whose electronic properties differ compared to the straight ribbons that constitute it. Upon using either Cu(111) or Ag(110) as substrate, metal-coordinated polymers were obtained which could not be transformed into GNRs. However, by adjusting the substrate temperature during deposition either homochiral or heterochiral 1D polymers could be obtained.



**Fig. 1:** a) Schematic displaying the two DBCh enantiomers and the chevron-like GNR obtained upon annealing. b) Constant height STM image obtained with a CO-functionalized tip. Scale bar: 5 Å.

On the other hand, graphene has been shown to be an effective buffer layer. Among others, the chemical inertness and the low density of states near the Fermi level enable the decoupling of adsorbed molecules from the underlying (metallic) substrate. Importantly, this holds the promise to preserve the intrinsic properties of the adsorbed species such as magnetic or catalytic properties [4]. In particular, we investigated the structural and electronic properties of 1D and 2D metal-organic coordination structures from polyphenyl dicarbonitriles and compared our findings to their properties on metallic surfaces [5].

## References:

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