Atomically-precise Graphene Nanoarchitectonics

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Abstract

Nanostructuring graphene, or combining it in lateral heterostructures or stacks, can bring new and highly tunable functionalities, turning it from semimetal into semiconductor, inducing magnetism or superconductivity, or introducing tailored reactivity and permeability. However, one of the most obnoxious challenges have been to pattern graphene on a small scale where even atomic level of disorder can ruin its properties. On-surface reactions, via programmed interactions of molecular building blocks, has recently emerged as a promising route to synthesise atomically precise materials from the 'bottom-up'.

Here, I will discuss progress we have made in engineering 1D and 2D graphene nanoarchitectures with atomic precision. I will describe our recent results to synthetize atomically precise 2D nanoporous graphene [1,3], 1D functionalized nanoribbons[4,5], superlattices [2] and hybrid heterostructures. Finally, we demonstrated its implementation in electronic devices and advanced filters and sensing systems.

REFERENCES

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FIGURES

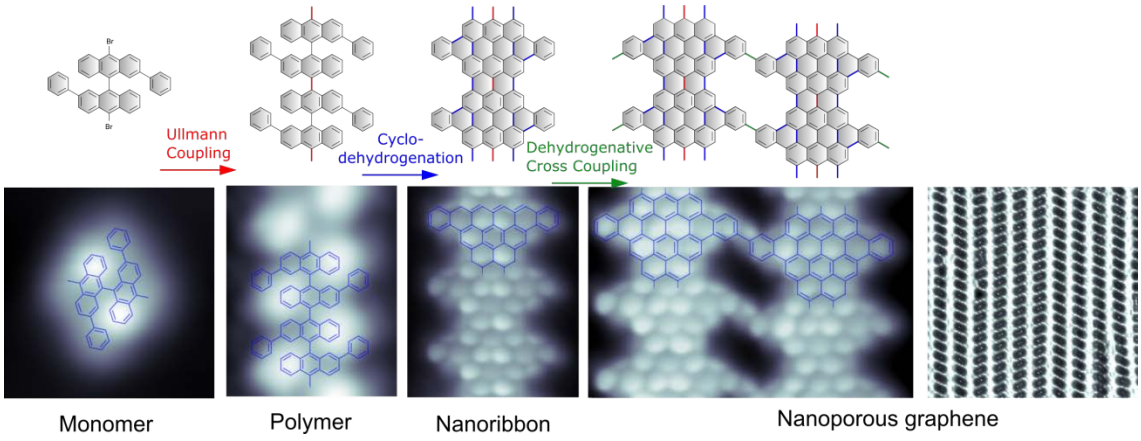

Figure 1: STM images tracking the on-surface reaction towards the synthesis of atomically-precise nanoporous graphene.