Formation of 0D and 1D Graphene-based Nanostructures by [2+2] Cycloaddition of Ortho-dihalogen Aromatics

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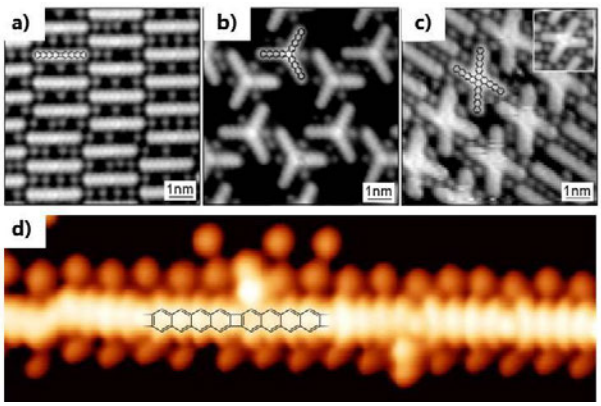
During the last decade, on-surface chemistry has experienced a significant development driven by the necessity of finding novel tools for the fabrication of new (macro)molecular structures with novel properties. Several synthetic reactions commonly used in traditional solution-based chemistry have recently been applied to on-surface chemistry [1-3]. This approach has allowed for the fabrication of novel structures with fascinating properties such as metal-organic frameworks, covalent organic frameworks (COF) or graphene nanoribbons, to name only some of them. However, there is still a wide variety of coupling reactions that are well-known in solution-based chemistry but which have not yet been explored with respect to on-surface chemistry. This is the case, for example, of the [2+2] cycloaddition for the controlled formation of carbon tetragons.

In this talk, we will present the on-surface synthesis of 0D and 1D graphene-based nanostructures via [2+2] cycloaddition of halogen-functionalized precursor monomers. For this purpose, we have used aromatic precursors which have been functionalized at ortho-positions, a novel approach in on-surface reactions. We will show, by means of high-resolution scanning tunnelling microscopy and non-contact atomic force microscopy, that these precursor monomers afford the formation of carbon tetragons. Furthermore, we show that the functionalization pattern of the precursor monomers allows for the selective formation of either 0D or 1D nanostructures.



References

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