On-surface chemistry: from metal to bulk insulator

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Over the two past decades, on-surface covalent synthesis of organic nanostructures, has been widely investigated in the aim of fabrication of molecular electronic components and functional nanomaterials, owning to the Scanning Probe Microscopy monitoring which enhanced the synthesis comprehension at the atomic-scale size precision.[1] Here, we propose three examples of on-surface chemistry. On a metallic surface, we will use the temperature as an efficient tool to achieve the formation of graphene nanoribbons. [2] On a semi-conductor, we introduce a new strategy to obtain alkyl oligomers in a controlled manner using on-surface radical oligomerisations that are triggered by electrons between the tip of a scanning tunnelling microscope and the Si(111)-B surface.[3] On an insulating surface, we use photons to provoke a radical polymerization leading to the formation of 1D-polymer with a micrometer length. [4]

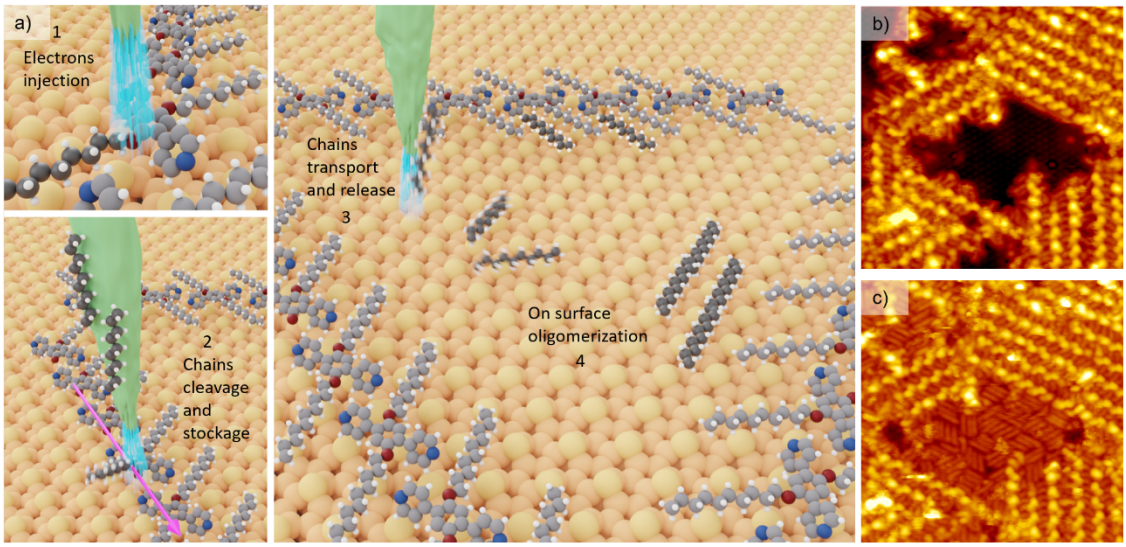

Figure: a) Representative schemes of the new strategy showing the subsequent steps of stm tip induced olygomerisations on Si(111)-B surface. b) STM image (25x25 nm^2, Vs = -1.3 V, It = 7 pA, T = 110 K) representing an nano-pore inside the supramolecular network. c) The same nano-pore fully filled with rod-like structure released by STM tip during scanning.

References

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