

Building-up Supramolecular Self-Assemblies on Surfaces : Towards “Molecular Nanoelectronics”

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Abstract

Plastic electronics appears today as an alternative to conventional semiconductors technologies. Self-assembly of functional organic molecules on atomically flat surfaces opens new perspectives towards *molecular nanoelectronics*, a realistic strategy in the miniaturization of electronic devices [1]. One simple way to investigate 2D supramolecular self-assemblies at the nanoscale is to generate them at a liquid-solid interface and observe them *in situ* by means of scanning tunneling microscopy (STM). A variety of 2D architectures have been recently obtained with functional molecules (liquid crystals, molecular wires, etc) by controlling the molecule-molecule and molecule-substrate interactions [2,3]. One step further, we recently demonstrated the possibility to work in the vertical dimension and pile-up two or three self-assembled monolayers (SAMs) of similar or different molecules on top of each other at a liquid-solid interface. A spectacular example is the controlled growth and manipulation of “magic clusters”, i.e. self-organized close-shell islands of exceptional stability, of long *n*-alkanes in ambient conditions. Even further, we now use SAMs of *n*-alkanes deposited on a solid substrate as tailored templates for the growth of self-assembled bi- and trilayers of large conjugated discal molecules possessing electrical and/or optical properties. In conclusion, the growth and handling of novel homo- or heteromolecular 2D and 3D functional self-assemblies can be easily controlled at the molecular and atomic level on surfaces and integrated as active materials into nanosize electronic devices.

References

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