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Supramolecular networks on a Silicon Surface or on Insulators

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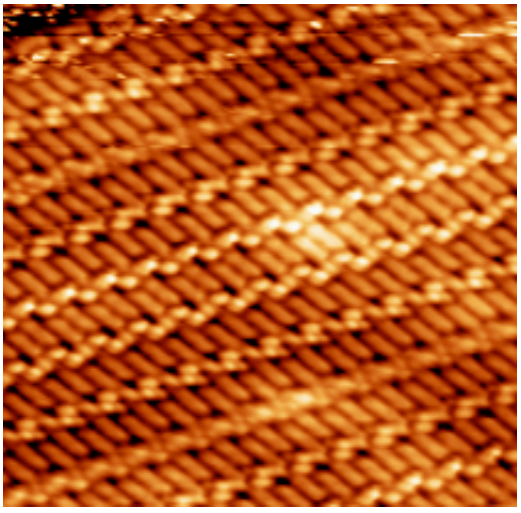
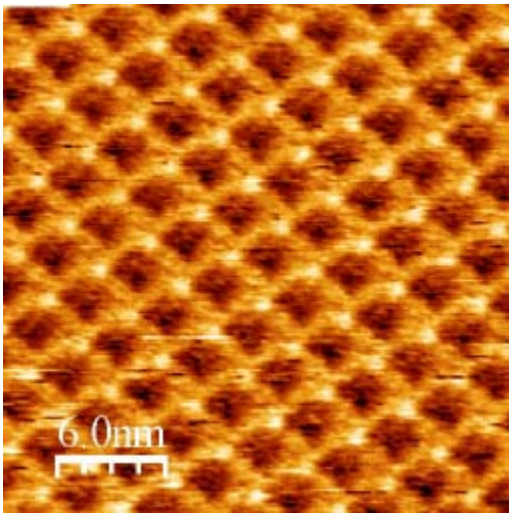
The aim of this work is to understand and to control the adsorption of organic molecules on ionic substrates and silicon surface by means of a joint work of molecular synthesis, nc-AFM or STM imaging. The influence of the substrate lattice constant was also investigated by depositing the molecules on different substrates. The chosen molecule (CDB) consists of a central part with three phenyl rings and two lateral alkyl chains $(CH_2)_9$-CH_3.
The alkyl chains were added to the molecule in order to facilitate the two-dimensional (2D) growth by interdigitation between alkyl chains of adjacent molecules. The central part of the molecule is ended by cyano groups on the one hand to modify the molecule-substrate (MS) interaction and, on the other hand, to favour the molecule-molecule (MM) interaction. Nc-AFM or STM high resolution images acquired at room temperature and under ultra high vacuum show highly ordered organic layers and confirm that our strategy to obtain 2D molecular assembly on ionic substrates and silicon surface is successful [figure1].





Supramolecular framework on a silicon-based surface (left) or KCl (right)

Our work shows that the ordered growth is driven by the conformational adaptability of the molecule, the commensurability between the molecular layer and the substrate, and the proper choice of polar end-groups which enforce both, the MM as well as the MS interaction.