

Toward conformational identification of molecules in 2D and 3D self-assemblies on surfaces

Ali HAMADEH¹, Frank PALMINO¹, Jérémie MATHURIN², Ariane DENISET-BESSEAU², Vincent LUZET¹, Judicaël JEANNOTOT¹, Alexandre DAZZI², Frédéric CHERIOUX¹

¹ Université de Franche-Comté, CNRS, FEMTO-ST, F-25000 Besançon, France.

² Université de Paris-Saclay, Institut de Chimie-Physique, F-91400 Orsay, France.

The design of supramolecular networks based on organic molecules deposited on surfaces is highly attractive for various applications. One of the remaining challenges is the expansion of monolayers to well-ordered multilayers to enhance the functionality and complexity of self-assemblies. In this study, we present an assessment of molecular conformation from 2D to 3D supramolecular networks adsorbed onto an HOPG surface under ambient conditions utilizing a combination of scanning probe microscopies and atomic force microscopy- infrared (AFM-IR). We have observed that the infrared (IR) spectra of the designed molecules vary from layer to layer due to the modifications in the dihedral angle between the C=O group and the neighboring phenyl ring, especially in the case of a 3D supramolecular network consisting of multiple layers of molecules [1].

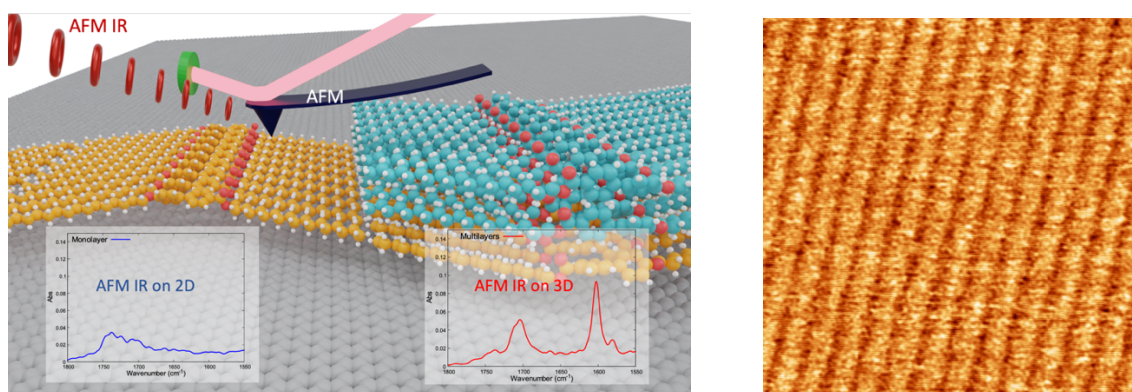


Figure 1 : Principle of the conformational identification of molecules in 2D and 3D self-assemblies by combining STM, AFM and AFM-IR (left) and Topography AFM image (right, 65×65 nm²) of a monolayer of EsterOC18 molecules deposited on a HOPG surface showing a compact periodic network constituted by bright lines separated by darker stripes, with a periodicity of 5.60 ± 0.1 nm.

Références

- [1] Hamadeh, A.; Palmino, F.; Mathurin, J.; Deniset-Besseau, A.; Grosnit, L.; Luzet, V.; Jeannoutot, J.; Dazzi, A.; Chérioux, F. *Communications Chemistry* **2023**, *6*, 246.