NC-AFM and KPFM study of the adsorption of triphenylene derivatives on KBr(001)

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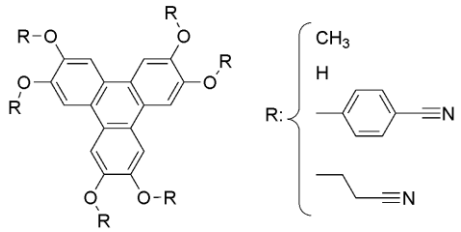
We have started a program aimed at imaging single molecules on the surface of a bulk insulator at room temperature. This task is essential to the goal of connecting a molecule to metallic electrodes in a planar geometry to build a single molecular device [1]. One of the major difficulties in this task is to immobilize the molecules on the surface of the sample. The diffusion barrier of most molecules on usual insulating surfaces is generally quite low making room temperature diffusion too fast for imaging.

In this study KBr(001) was chosen as a substrate for its ease of preparation and the relative facility for atomic resolved imaging. On this substrate, the molecule-surface interaction is usually dominated by electrostatic forces. Our approach consists in equipping a flat, aromatic triphenylene molecular core with different peripheral polar groups, as shown in the figure.



The adsorption of two of these molecules was studied in detail: R=CH3 (Hexa-methoxytriphenylene: HMTP [2]) and R=propyl-CN (2,3,6,7,10,11-Hexacyanopropyl-oxytriphenylene: HCPTP [3]). Kelvin probe measurements were performed on HCPTP.

These results will be discussed with a special emphasis on low coverage measurements at low coverage where what we interpret as small aggregates of molecules or even single molecules adsorbed on a defect could be manipulated.

[1] Multiple atomic scale solid surface interconnects for atom circuits and molecule logic gates, Joachim, C;. Martrou, D.; Rezeq, M.; Troadec, C.; Jie, D.; Chandrasekhar, N.; Gauthier, S. *J. Phys.: Condens. Matter* **2010**, *22*, 084025.

[1] NC-AFM study of the adsorption of hexamethoxytriphenylene on KBr(001) A. Hinaut, K. Lekhal, G. Aivazian, S. Bataillé, A. Gourdon, D. Martrou and S. Gauthier, J. Phys. Chem. C, 115(27), 13338-13342 (2011).

[2] A NC-AFM and KPFM study of the adsorption of a triphenylene derivative on KBr(001)**,** A**.** Hinaut, A**.** Pujol, F**.** Chaumeton, D**.** Martrou, A**.** Gourdon, S**.** Gauthier**,** Beilstein J. Nanotechnol. 2012, 3, **221–229.**