Molecular self-assembled networks on silicon surface

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Nowadays more than 90% of published results show molecules adsorbed onto metallic or HOPG surfaces. This is explained by the low reactivity between molecules and these surfaces which induce a molecular diffusion and the possibility to observe large and perfect self-assemblies. Nevertheless, there are a real economic and technological interests to develop molecular self-assembled layers onto semiconductors and in particular onto silicon surfaces. Actually, due to the existence of Si dangling bonds which induce a strong interaction between molecules and substrates, the formation of such molecular layers is still a real challenge. To circumvent this problem, we need atomically passivated Si surface. Here, an original unreactive silicon surface is presented: the high boron doped silicon √3x√3-SiB (111) reconstruction. Since 10 years, very amazing results have been obtained showing large and perfect molecular self-assemblies by deposition of home-made and specifically designed aromatic molecules on this silicon surface [See Fig. 1~~Fig. 1~~]. The morphology of each supramolecular network is explained by the competition between molecule-moleucle and molecuel-surface interactions [1-4].

Mis en forme : Police :Non Gras

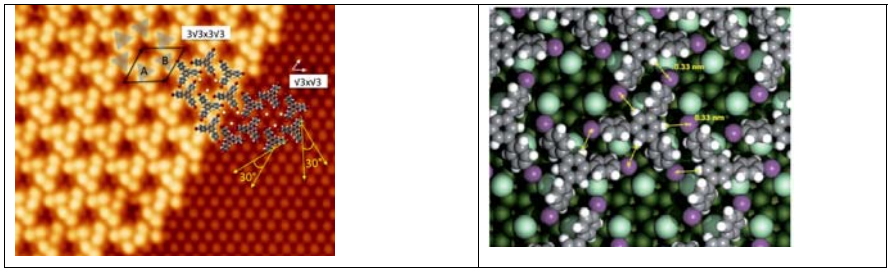

Fig. 1*: Left: STM image of the molecular network (Vs=2.3 V, It=0.037 nA, 15x15 nm2). Right: molecular model adsorbed onto Si(111)-B showing pi-stacking and halogen bonds interactions*

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Bibliography
[1] *B. Baris, V. Luzet, E. Duverger, P. Sonnet, F. Palmino, F. Cherioux, Angew. Chem. Int. Ed.* ***50****, 4094 (2011)*
[2] *Y. Makoudi, M. Beyer, S. Lamare, J. Jeannoutot, F. Palmino, F. Chérioux, Nanoscale* ***8****, 12347-12351 (2016)*
[3] *G. Copie, F. Cléri, Y. Makoudi, C. Krzeminski, M. Berthe, F. Chérioux, F. Palmino, B. Grandidier, Phys. Rev. Lett.* ***114****, 066101 (2015)*
[4] *Y. Makoudi, M. Beyer, J. Jeannoutot, F. Picaud, F. Palmino, F. Chérioux, Chem. Commun.* ***50****, 5714-5716 (2014)*