

Internship proposal 2009-2010

Laboratory: Laboratoire de Chimie Physique Matière et Rayonnement	<i>laboratory logo (optional)</i>
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Title for the scientific project

Electronic structure of hybrid organic/inorganic compounds

Scientific project :

The fabrication of organic/inorganic semiconductor hybrid structures is the subject of a worldwide research effort due to the possible applications in the field of organic electronics. In the last decade, specific attention was devoted to reaction of organic molecule with the (001) oriented silicon, reconstructed 2×1 , which can be used as a template for the grafting of organic molecules arrays via the reaction of molecular functionalities (π bonds, amines, alcohols, etc.) with surface silicon dangling bonds in ultra high vacuum (UHV) conditions

The proposed internship will consist to study the influence of interaction of hexamethyldisilane (HMDS) and derivatives compounds with hydroxylated silicon surface.

Hexamethyldisilane is widely used in the semiconductor industry as a precursor for microlithographic process to improve photoresist adhesion to oxides. The efficiency of HMDS on adhesion is correlated with the reactivity of this compound with surface hydroxyl groups forming a strong bond to the oxide surface in a process known as silylation. The new siloxane end product, i.e. $\text{Si-O-Si}(\text{CH}_3)_3$ (TMS trimethylsilyl) renders the surface more hydrophobic and leads to greater wettability by photoresist.

Techniques in use:

X-ray photoemission spectroscopy (XPS), x-ray absorption spectroscopy (NEXAFS). The work will be carried out on European synchrotron radiation facilities (including SOLEIL synchrotron). Scanning tunneling microscopy (STM) will also be used to have a view of the systems morphology.

Applicant skills:

Stronger interest in surface science and experiment work.

Granted internship: yes (~400 €/month)

C'nano IdF laboratory (France only): yes

Possibility for a thesis: yes, financial support to be defined