PROPOSITION DE STAGE M1

Année universitaire 2025-2026

Titre: XPS study of $C_{60}F_{48}$ interaction with Pt(111) surface

Parcours prioritaire (mention obligatoire) : CDM/PPN

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Description du sujet:

The interaction of halogens with metals takes place in important processes in industry, microelectronics and homogeneous catalysis. Understanding of corrosion phenomena as well as the protection of metal surfaces is highly interesting in modern technologies. The data of fluorine-platinum chemical interaction on the surface are missing or have attracted very little attention. There is also an intriguing problem of surface platinum fluoride formation existence and its crystal structure.

The F-induced surface structures on platinum will be prepared by fluorinated fullerene ($C_{60}F_{48}$) molecule evaporation on clean Pt(111) crystal. The fullerene molecules, being adsorbed at submonolayer coverage at room temperature, self-assemble on the surface. The fullerene islands lose the fluorine atoms gradually, forming different fluorine superstructures on the platinum surface non covered by fullerenes.

The platinum fluorination level will be controlled by F1s and Pt4f XPS (X-ray Photoelectron Spectroscopy) peaks behavior. It is expected to establish fluorine and platinum chemical states for different fluorine concentration and depending on observed surface superstructures. Additional information will be obtained by Scanning Tunneling Microscope (STM).

The applicant will be trained to XPS method in ultrahigh vacuum conditions. The acquired knowledge will be used to perform XPS experiments, data acquisition and their treatment by appropriate software for data analysis, conclusions and presentation of results.

Connaissances requises particulières :