

Standard Project

Experimental Report template

Proposal title: Study of the Pt(111) electrochemical interface in sulfuric acid media with <i>in situ</i> Surface Resonant X-Ray Diffraction (SRXR)		Proposal number: 02-02-864
Beamline: D2AM	Date(s) of experiment: 21-27 november 2018	Date of report: 12 march 2019
Shifts: 18	Local contact(s): Nils Blanc	Date of submission:

Objective & expected results (less than 10 lines):

By performing in electrochemical environment *in situ* Surface Resonant X-Ray Diffraction (SRXR) and Surface X-Ray Diffraction (SXR) on Pt(111) in 0.1M H₂SO₄, we wanted to specifically investigate the valence state of the surface Pt atoms and the structure of the ordered adsorbed species in specific potential regions.

Results and the conclusions of the study (main part):

We could successfully perform *in situ* SRXR across the L_{III} edge of Pt at several potentials and for two polarisation configurations (incident electric field // and \perp to the crystal surface). SXR measurement were also made. We could use the crystal analyser in the detection system, allowing a definitely better signal/noise ratio (rejection of fluorescence signal).

Measurements clearly show the influence on the signal of the polarisation, but also of the applied potential (see figure 1). Data analysis is underway and ab-initio calculations using FDMNES software will be done.

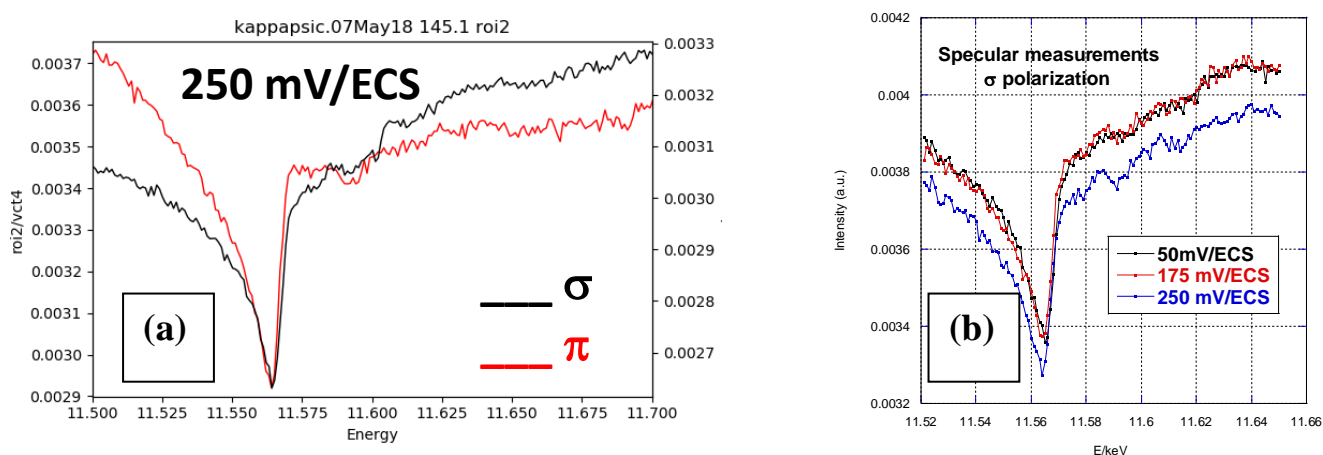


Figure 1: SRXR measurements at 250mV/ECS: large influence of polarization is clearly seen (a). An energy shift is induced by potential variation (b).

Justification and comments about the use of beam time (5 lines max.):

In situ SRXR/SXR experiments in electrochemical environment on ultra-thin metallic layers can be done only with the high brilliance of a synchrotron source.

D2AM is a perfectly suited beam line for *in situ* surface diffraction study in electrochemical environment.