

# Standard Project

## Experimental Report template

<b>Proposal title: Detailed investigation on the mechanisms of Pd electrochemical deposition onto Au(111)</b>		<b>Proposal number: 02-02-811</b>
<b>Beamline: D2AM</b>	<b>Date(s) of experiment:</b> 2013	<b>Date of report:</b>
<b>Shifts: 18</b>	<b>Local contact(s):</b> Nils Blanc	<i>Date of submission:</i>

Objective & expected results (less than 10 lines):

We wanted to observe the influence of the substrate and of the ions present in the electrochemical solution on the structure of Pd films electrochemically deposited onto Au(111). We performed in situ Surface X-Ray Diffraction experiments during Pd deposition in order to get information about the growth mechanisms; we also made the structural characterisation of the films at various thicknesses.

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

We could successfully follow the kinetic of Pd deposition and the structure of the obtained film as a function of their thickness. The layer-by-layer growth mode up to 2 layers was clearly identified. The structure of the films thicker than 2 monolayers reveals the presence of huge islands, covering only about 20% of the underlying surface. The Pd/Au(111) film structure is very different compared to Pd/Pt(111) films.

2 papers have been published.

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

In situ SXRDXRD 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.

**Publication(s):**

1) "Mechanisms of the initial steps in the Pd electro-deposition onto Au(111)", Eric Sibert, Liang Wang, Maurizio De Santis, Yvonne Soldo-Olivier, *Electrochimica Acta*, 135 (2014) 594-603

2) "Growth mechanisms of Pd nanofilms electrodeposited onto Au(111): an in situ grazing incidence X-ray diffraction study", Y. Soldo-Olivier, M. De Santis, W. Liang, E. Sibert, *Physical Chemistry Chemical Physics*, **18** (2016) 2830 - 2839

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