EUROPEAN **S**YNCHROTRON **R**ADIATION **F**ACILITY

INSTALLATION EUROPEENNE DE RAYONNEMENT SYNCHROTRON

Experiment Report Form

The double page inside this form is to be filled in by all users or groups of users who have had access to beam time for measurements at the ESRF.

Once completed, the report should be submitted electronically to the User Office using the **Electronic Report Submission Application:**

http://193.49.43.2:8080/smis/servlet/UserUtils?start

Reports supporting requests for additional beam time

Reports can now be submitted independently of new proposals – it is necessary simply to indicate the number of the report(s) supporting a new proposal on the proposal form.

The Review Committees reserve the right to reject new proposals from groups who have not reported on the use of beam time allocated previously.

Reports on experiments relating to long term projects

Proposers awarded beam time for a long term project are required to submit an interim report at the end of each year, irrespective of the number of shifts of beam time they have used.

Published papers

All users must give proper credit to ESRF staff members and proper mention to ESRF facilities which were essential for the results described in any ensuing publication. Further, they are obliged to send to the Joint ESRF/ ILL library the complete reference and the abstract of all papers appearing in print, and resulting from the use of the ESRF.

Should you wish to make more general comments on the experiment, please note them on the User Evaluation Form, and send both the Report and the Evaluation Form to the User Office.

Deadlines for submission of Experimental Reports

- 1st March for experiments carried out up until June of the previous year;
- 1st September for experiments carried out up until January of the same year.

Instructions for preparing your Report

- fill in a separate form for each project or series of measurements.
- type your report, in English.
- include the reference number of the proposal to which the report refers.
- make sure that the text, tables and figures fit into the space available.
- if your work is published or is in press, you may prefer to paste in the abstract, and add full reference details. If the abstract is in a language other than English, please include an English translation.

ESRF	**Experiment title:** In-situ X-ray Scattering Studies of Ordered Oxides and CO on Pt(*hkl*) Electrodes Modified by Pd Monolayers	**Experiment number**: SI-499
Beamline: ID03	**Date of experiment**: from: 24/1/00 to: 31/1/00	**Date of report**: 1/9/01
Shifts: 18	**Local contact(s)**: Paul Steadman	*Received at ESRF:*

Names and affiliations of applicants (* indicates experimentalists):

Christopher Lucas* University of Liverpool

Nenad M Markovic* Lawrence Berkeley National Laboratory

Bridget Murphy* Daresbury Laboratory

Report:

The abstract from a paper resulting from this work is attached:

Title: Growth Mechanism of Pd films on Pt(111) and Pt(001) Electrode Surfaces - an *in-situ* x-ray diffraction study

Authors: M.J.Ball[1], C.A. Lucas[1], N.M. Markovic[2], T.J. Schmidt[2], V. Stamenkovic[2,] P.N Ross[2]

Afilliations: [1]Oliver Lodge Laboratory, Department of Physics, University of Liverpool, L69 7ZE, UK. [2]Materials Sciences Division, Lawrence Berkeley National Laboratory, University of California, Berkeley, CA 94720.

Journal: Journal of Physical Chemistry, to be submitted

Abstract text:

The physical and chemical properties of thin metal films deposited on foreign metal substrates has been an area of growing scientific interest in recent years as these films usually possess quite different properties from the bulk metal. The surface structure of thin metal films can have a profound effect on the electrochemical and catalytic properties of modified electrodes and is intrinsically linked to the growth mechanism of the metal deposit. Through the use of surface x-ray scattering (SXS) measurements of electrochemically deposited Pd films, our results for Pt(111) show that after the formation of a full psuedomorphic monolayer, the Pd grows via three dimensional islands. For

Pt(001) a similar mechanism occurs although the first Pd layer only reaches a coverage of 0.7 ML before the growth of the second layer begins. Although the adsorption of CO onto the multilayer Pd films does not change the atomic structure, the presence of CO on the surface appears to enhance the absorption of hydrogen into the bulk of the Pd film which leads to an expansion of the Pd lattice that is reversible as the electrode potential is cycled.