EUROPEAN SYNCHROTRON RADIATION FACILITY

INSTALLATION EUROPEENNE DE RAYONNEMENT SYNCHROTRON

ESRF

# 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 via the User Portal:

*https://wwws.esrf.fr/misapps/SMISWebClient/protected/welcome.do*

***Reports supporting requests for additional beam time***

Reports can 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:** Structural investigation of Cu-V-O thin films fabricated using the seeded growth approach. | **Experiment number**: 01-02-1176 |
|---|---|---|
| **Beamline**: | **Date of experiment**: from: 21 April 2018 to: 24 April 2018 | **Date of report**: 24.09.2018 |
| **Shifts:** | **Local contact(s)**: Dmitry Chernyshov | *Received at ESRF:* |

**Names and affiliations of applicants** (* indicates experimentalists):

Michal Strach*
Chethana Gadyiar*
Laia Castilla*
Raffaella Buonsanti

Laboratory of Nanochemistry for Energy, Institute of Chemical Sciences and Engineering, EPFL, Sion, 1050, Switzerland

**Report:**

The performed experiemnts are a reported in a publication:
"Assembly of β-Cu2V2O7/WO3 nanocomposites and the impact of their composition on structure and photoelectrochemical properties."

Abstract:
Multinary metal oxides and their heterostructures play a key role as light absorbers in the production of solar chemicals. Synthetic tunability is crucial to understand the impact of composition and structure on the photoelectrochemical performance. Here, we assemble β-Cu2V2O7/WO3 heterostructured nanocomposites using a novel seeded-growth approach which allows an unprecedented compositional tunability. A 10 fold increase in the net photocurrent density towards sulfite oxidation was measured for the nanocomposite with the lowest loading of WO3 (β-Cu2V2O7 : WO3 = 1 : 0.1) as compared to the bare β-Cu2V2O7 counterpart. This improvement is attributed to the formation of an intimate junction between the two metal oxides which favors charge transfer and separation. An increase in the WO3 content results in the formation of macroscopic phase segregated domains which reduce these interfacial areas, thus degrading the phototoelectrochemical performance of the nanocomposites. While highlighting the effectiveness of heterostructuring and the importance of compositional tunability, this study points at the emerging need of techniques to control and to probe the intrinsic inhomogeneity of these complex inorganic heterojunctions.

M. Scarongella, C. Gadyiar, M. Strach, L. Rimoldi, A. Loiudice, R. Buonsanti* “Assembly of β-Cu2V2O7/WO3 nanocomposites and the impact of their composition on structure and photoelectrochemical properties ” J. Mater. Chem. C. 2018, (invited for themed collection: Journal of Materials Chemistry C Emerging Investigators)

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