



## Centre for Doctoral Training in Condensed Matter Physics

### CDT-CMP Seminar Series

3:00pm Tuesday 5<sup>th</sup> December 2017

\*\*\*Please note start time of 3pm\*\*\*

### ‘Electrochemical Design of Pt-Bimetallic Nanostructures’

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The design of highly active Pt bimetallic nanostructures such as strained thin films, alloys and nanoclusters has been of great interest for the development of commercially viable electrocatalysts for fuel cells applications. The confinement and reduction of the dimensions to few atomic layers coupled with the proximity of Pt to another metal, resulting in the electronic and geometrical effects can substantially alter the catalytic performance of Pt.

The design of epitaxial Pt nanostructures with the atomic scale control has been a great challenge. Pt is a metal that has a very high surface energy and low diffusivity and as such follows three-dimensional growth regardless of the (conventional) method of growth. We have developed an electrochemical method that can produce Pt thin films and alloys with high control of atomic structure and thickness called Surface Limited Redox Replacement (SLRR). The SLRR method is based on the replacement of an epitaxial electrodeposited monolayer of a less noble metal by a more noble Pt through an irreversible surface-controlled limited redox reaction. In this talk, I will describe SLRR based design of different types of Pt nanostructures on Au and Pd/Au substrates developed in our group: epitaxial films, alloys and clusters (different size and distribution). The SLRR method was used to design high-quality 2D model Pt bimetallic systems that enabled us to study their electrochemical and catalytic behaviour as a function of structure (e.g. film thickness, alloy composition, clusters size, surface coverage, etc.).

**3.29, HH Wills Physics Laboratory, University of Bristol**

*Coffee will be served after in the Common Room 3.32*

**Streaming to room Bristol Room 3W4.1, University of Bath**

If you would like to meet with the speaker before or after the seminar,  
please contact [cdt-cmp@bristol.ac.uk](mailto:cdt-cmp@bristol.ac.uk)

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