ALBA SYNCHROTRON LIGHT SOURCE

SEMINAR

Rising the pressure up from UHV to 1 bar in gas phase and bulk-liquid in operando PES

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Place: Maxwell Auditorium

Abstract

An in depth understanding of the atomistic mechanism underlying different chemical processes requires recording large sets of data under *operando* conditions yielding key information of the interface. Thus, the desired parameters to be known include the chemical composition at the interface, chemical states of the atoms and their variation as a result of the chemical or electrochemical reactions as well as the structural evolution. Unfortunately the analytical techniques able to provide interface information are very limited and hardly compatible with gases and liquids at high pressure [1,2] allowing usually only *ex situ* characterizations leading to a loss of important information as in many cases the intermediates and actives species cannot be “quenched” in post process analysis. X-ray spectroscopy techniques are able to provide relevant information of the electronic structure in an element specific manner but real interfaces are buried and most of the time in presence of gases and liquids electrolytes being inaccessible directly to the common surface sensitive techniques like photoelectron spectroscopy requiring new experimental strategies for their investigation under these conditions. In this talk I will present some of the new approaches that I developed during the lasts years which allow the investigation of the electronic structure variation of the catalysts and electrocatalysts under reaction conditions using photoelectron spectroscopy, from gas phase up to bulk aqueous electrolyte. During these talk I will illustrate quickly the capabilities of these setups using two examples, the selective hydrogenation of alkynes on Pd catalyst (gas phase reactions) [3] and the electrocatalytic oxygen evolution on iridium oxide electrocatalysts (liquid phase reactions) [4]. These results will be put in perspective with the future 3Sbar beamline highlighting the importance of a setup with its capabilities.

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