COLLÈGE DE FRANCE
1530

CHRISTOPHE COPÉRET

Department of Chemistry and Applied Biosciences, ETH Zürich

Controlled Functionalization and Molecular Understanding of Surfaces : Towards supported single-site catalysts and beyond.

Mercredi 6 janvier 2016 à 11heures
Salle 2

BIOGRAPHY

Prof. C. Copéret was trained in chemistry and chemical engineering in CPE Lyon and then undertook a PhD in chemistry at Purdue University (USA) under the supervision of Prof. Negishi (1996). After a postdoctoral stay in the group of Prof. Sharpless, he joined C2P2 (at the time LCOMS) as a CNRS researcher in 1998 and was promoted CNRS Research Director in 2008. Since 2010, he is Professor at the Department of Chemistry at ETH Zürich. His research interest lies at the interface of molecular, material and surface chemistry with applications in catalysis, energy, imaging and microelectronics, and his work relies on the combination of advanced spectroscopic methods like Surface Enhanced NMR Spectroscopy and computational chemistry.

ABSTRACT

Homogeneous and heterogeneous catalysts have, each, specific advantages. While homogeneous catalysts are typically associated with efficient chemical transformations at low temperatures (high selectivity) and molecular understanding of catalytic events (structure – activity relationship), heterogeneous systems are typically preferred in term of processes (easier regeneration and separation processes).

Here, we will show how it is possible to combine the advantages of homogeneous and heterogeneous catalysts by the controlled functionalization of the surfaces of oxide materials and by the characterization of surface species at the molecular level, thus allowing more predictive approaches.

We will illustrate the power of this approach with the development of well-defined “single-sites”, whose performance and stability can in some cases exceed these of both homogeneous and heterogeneous catalysts.

With our current level of understanding of surfaces, we will also discuss new directions in this field, i.e. understanding defect sites of surfaces and metal-support interactions at the molecular level, introducing diversity in oxide chemistry, controlling the growth of nanoparticles, the development of NMR techniques for the expeditious characterization of surface species in order to bridge the gap between well-defined systems and industrial catalysts.