XAS's contribution to IRC(IRCELYON) research in the field of catalysis

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ABSTRACT

From the early beginnings of the use XAS at LURE until now at Soleil and the ESRF (as well as other SR), the "Institut de recherche sur la Catalyse" (IRC, now IRCELYON) has been involved in the development of *in situ* or *operando* studies related to several domains of catalysis and types of catalysts. We will summarize some of the main findings and developments performed in collaboration with beam lines scientists for the benefit of one of the major fields of application of XAS. Three years after the creation of LURE in 1973, A Renouprez and B. Moraweck from IRC submitted a proposal to solve the structure of supported Pt nanoparticules [1] and a few years later built up a cryofurnace for combining heat treatment and further analysis at liquid nitrogen temperature. The application of EXAFS was at that time mainly addressing Pt supported catalysts rapidly extended supported carbonyl clusters[2], nickel-based catalysts (either Raney or supported), Pd based catalysts and their alloys[3]. In the 1990, via a collaboration with M. Danot of IMN Nantes, started the investigation of many types of transition metal sulfides and the development of cells of *in situ* sulfidation of studying industrial catalysts in collaboration with IFPEN or EURECAT[4]. In parallel, J. M. Millet was investigating partial oxidation catalysts following the variation of oxidation states by XANES.[4] P. Afanasiev was the last user of a XAS beamline at LURE !

The French community of XAS took benefit of the development of CRG beamlines (IF then FAME and FAME UHD) at the ESRF which allowed the investigation by fluorescence of low loading catalysts, photocatalyst or poisons, first QEXAFS studies of catalysts, use of high resolution XANES (for instance Pt/CeO_2). Then, the construction of Soleil SR brought beamlines (Samba and then Rock) in perfect adequation for studying the dynamic of catalysts during pre-treatment or catalysis. Activation or operando studies performed by QXAS, brought to catalysis community outstanding results for instance with ultradispered catalysts[5]. This presentation will give an overview, throughout history, of the contributions of our Institute in the application of XAS to the field of heterogeneous catalysis.

References

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