PhD position at IFP Energies nouvelles (IFPEN) in Physical sciences

Multi-technique analysis of porous networks in gamma-alumina supports

Heterogeneous catalysts have applications in very different fields, such as the production of fuels and of chemical intermediates, synthesis of drug molecules or decontamination of liquid or gaseous effluents. Heterogeneous catalysts can develop very complex porous structures, with porous organizations ranging from the nanometer to the millimeter scale. Moreover, spatial heterogeneity and anisotropy can be present at each organization level. All these porous properties impact the mass transfer kinetics in the catalyst, i.e. the performance of the catalytic process. To better characterize them is therefore a major challenge. For this purpose, numerous physicochemical techniques have been developed over the years, such as X-ray tomography and diffraction, nuclear magnetic resonance, nitrogen adsorption isotherms, electron microscopy, etc. However, none of these techniques gives access by itself to all the information necessary needed to reconstruct the porous network in all its complexity. The first objective of the PhD is therefore to conceive a global multi-technique characterization strategy and to test its efficiency on a model catalyst sample. Secondly, different industrial catalysts will be fully characterized, so as to better understand the relationship between geometrical properties and mass transfer in porous solids. Through this PhD, the student will acquire important skills in numerous physicochemical characterization techniques, but also in other scientific fields such as solid synthesis and pore network modelling. The student will interact with the specialists in the different fields both in IFPEN and in UCL, this PhD being a joint project between the two institutions.

Keywords: Characterization, alumina, porous medium, diffusion, porosity, tortuosity

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PhD location: IFP Énergies nouvelles, Lyon, France and UCL, London, UK
Duration and start date: 3 years, starting preferably on November 1, 2018
Employer: IFP Énergies nouvelles, Lyon, France
Academic requirements: University Master degree in Chemical Engineering
Language requirements: Fluency in French or English, willingness to learn French
Other requirements: Characterization of (porous) solids, mass transfer phenomena, analytical methods

For more information or to submit an application, see [theses.ifpen.fr](http://theses.ifpen.fr) or contact the IFPEN supervisor.

About IFP Energies nouvelles
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