

PhD position at IFP Energies nouvelles (IFPEN) in *Chemical Sciences and Catalysis*

Selective hydrodesulfurization catalysts in dynamic regime : a combined transient kinetics / spectroscopy approach

The catalytic process for hydrotreating makes it possible to meet environmental standards in terms of specification of the sulfur content of the gasoline fuel. The catalysts used for this type of process must be able to respond to a double challenge: to allow hydrodesulphurization (HDS) of thiophene compounds (of alkylthiophene type) while limiting the hydrogenation of olefins (HydO) present in this type of oil cut. Indeed, the latter contributes a significant part to the combustion properties of the final gasoline, measured by the octane number. The development stakes around these catalysts are therefore focused on understanding the HydO / HDS selectivity and the identification of descriptors for selectivity. Significant selectivity variations are thus observed depending on the characteristics of the support and the impregnated CoMoS active phase. In this respect, numerous studies have attempted to link the *ex situ* properties (electronic, morphological) of the catalysts with the catalytic data obtained in steady state, without being able to establish clear correlations. The behavior and the evolution of the catalyst during the phase of initial regime (transient regime) remain to this day an unexplored field, whereas important variations of selectivity are also observed there. The transient regime is therefore an essential missing link for correlating initial characterizations and catalytic data. The objective of the thesis is to study the evolution of the catalyst before the establishment of the steady state regime, by coupling surface spectroscopic *in-situ* / *operando* analysis and transient kinetics. The acquired data will refine our understanding of selective HDS catalysts and improve the associated kinetic models.

Keywords: Catalysis, Hydrodesulfurization, Transient kinetics, Kinetic modelling, Infrared spectroscopy.

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IFPEN supervisor	Dr, GIRARD Etienne, Research Scientist, Catalysis by sulfides, etienne.girard@ifpen.fr
PhD location	IRCE Lyon, Lyon, France and IFP Energies Nouvelles, Lyon, France
Duration and start date	3 years, starting preferably on October 1, 2019
Employer	IFP Energies Nouvelles, Lyon, France
Academic requirements	University Master degree in Chemical Engineering and/or Heterogeneous Catalysis
Language requirements	Fluency in French or English, willingness to learn French
Other requirements	Knowledge in Infrared Spectroscopy

For more information or to submit an application, see theses.ifpen.fr or contact the IFPEN supervisor.

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