*Numéro de dossier : 2021-R064-04*

PhD position at IFP Energies nouvelles (IFPEN)

In Chemical sciences

Synthesis of Si/Al gradient zeolites and their use in adsorption, separation and catalysis

Zeolites are crystalline and microporous aluminosilicates. The perfectly controlled porosity and the presence of charges due to the presence of aluminum in the framework provides to these materials specific properties which give rise to very diverse applications (ion exchange, separation, adsorption, catalysis). These materials are beginning to be used more and more in industrial processes in the presence of water and temperature. For this it is necessary to have an active and stable material under hydrothermal conditions. The active site in a zeolite is usually a Bronsted acid, created by the presence of Al in its structure, for which there is strong competition between water and the molecules of interest. It is necessary to prepare zeolite crystals that exhibit a diffusional barrier to water while allowing easy access to molecules of interest at active sites.

The objective of this thesis are the synthesis of active and stable zeolites under hydrothermal conditions by creating an Si/Al composition gradient and the understanding of the conditions necessary for their preparation. The targeted approach combines the synthesis, characterization and testing of the materials obtained.

Through this thesis, the candidate will obtain a solid training in the synthesis and post-treatment of zeolites as well as in the characterization of crystallized porous solids. In addition, he will be confronted with the problems of the evaluation of such solids in catalysis and separation.

**Keywords**: zeolite, composition gradient

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| **Academic supervisor** | Dr., TUEL Alain, Institut de recherches sur la catalyse et l’environnement de Lyon, IRCELYON, ORCID : 0000-0001-7610-4074 |
| **Doctoral School** | ED206 - Ecole doctorale Chimie, Procédé, Environnement, https://www.universite-lyon.fr/recherche/doctorat/ecoles-doctorales/ed-206-chimie-procedes-environnement-4399.kjsp |
| **IFPEN supervisor** | Dr., HARBUZARU Bogdan Vasile, Divided Materials Egineering Department, bogdan.harbuzaru@ifpen.fr, ORCID : 0000-0001-9063-1874 |
| **PhD location** | - IFP Energies nouvelles, Lyon, France  - IRCELyon, Lyon, France |
| **Duration and start date** | 3 years, starting in fourth quarter 2021 |
| **Employer** | IFP Energies nouvelles, Rueil Malmaison, France |
| **Academic** **requirements** | University Master degree in chemistry |
| **Language requirements** | Fluency in French or English, willingness to learn French |
| **Other requirements** | Basic knowledge in XRD, N2 adsorption, MAS NMR. |

To apply, please send your cover letter and CV to the IFPEN supervisor indicated here above.

About IFP Energies nouvelles

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