

MASTER DE CHIMIE DE PARIS CENTRE - M2S2

Proposition de stage 2021-2022

Internship Proposal 2021-2022

Parcours type(s) / Specialty(ies) :

- Chimie Analytique, Physique et Théorique / *Analytical, Physical and Theoretical Chemistry* :
- Chimie Moléculaire / *Molecular Chemistry* :
- Chimie et Sciences Du Vivant / *Chemistry and Life Sciences* :
- Chimie des Matériaux / *Materials Chemistry*:
- Ingénierie Chimique / *Chemical Engineering*:

Laboratoire d'accueil / Host Institution

Intitulés / *Name* : Laboratoire de Réactivité de Surface

Adresse / *Address* : Campus Pierre et Marie Curie, Tour 43-33, 3^{ème} étage

Directeur / *Director (legal representative)* : Hélène Pernot

Tél / *Tel* : 01 44 27 25 77

E-mail : helene.pernot@sorbonne-universite.fr

Equipe d'accueil / Hosting Team :

Adresse / *Address* : Campus Pierre et Marie Curie, Tour 43-33, 3^{ème} étage

Responsable équipe / *Team leader* :

Site Web / *Web site* : <http://www.lrs.upmc.fr/fr/l-unite-de-recherche.html>

Responsable du stage (encadrant) / *Direct Supervisor* : Laurent Delannoy

Fonction / *Position* : Maître de conférences

Tél / *Tel* : 01 44 27 60 01

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Période de stage / *Internship period* * : February - June 2022

Titre / Title

Multi-metallic catalysts for the selective hydrogenation of alkynes and dienes

Projet scientifique (1 page maximum) / Scientific Project (maximum 1 page):

1. Description du projet / *Description of the project*

In industry, light alkenes, which are used for polymer synthesis, are derived from the cracking of alkanes. However, the cracking process results in the formation of a small amount of alkynes and dienes as impurities, and these are poisons of polymerization catalysts.

Selective hydrogenation reactions of these polyunsaturated hydrocarbons (alkynes and dienes) to alkenes are therefore of great importance for polymer synthesis because they allow the production of high-purity alkene monomers. Platinum group metals are currently the reference catalysts for hydrogenation reactions due to their high activity. Selective hydrogenation reactions are usually performed using palladium catalysts [1]. However, these elements are very rare and therefore expensive. Their partial or total replacement by more abundant and therefore less expensive metals is becoming a necessity and is currently the subject of an increasing number of researches.

* min. 5 mois à partir du 31 janv 2022 / *min. 5 months not earlier than January, 31st 2022.*

Fin de stage au plus tard le 15/07/2022 ou le 30/09/2022 (dates de validation de diplôme). / *End of internship at the latest July 15, 2022 or Sept. 30, 2022 (dates of graduation).*

The aim of this internship will be to synthesize, to characterize by various techniques and to evaluate under catalytic reaction conditions, different multi-metallic systems based on non-noble elements. These systems will be preselected on the basis of "volcano curve" correlations determined by DFT calculations (not performed by the student).

This internship is proposed in partnership with IFP Energies nouvelles (IFPEN).

2. Techniques ou méthodes utilisées / *Specific techniques or methods*

This internship will involve various methods of preparation of catalytic materials (impregnation, deposition-precipitation, colloidal syntheses). The obtained materials will be characterized by various physicochemical techniques (X-ray diffraction, surface analysis techniques (XPS), electron microscopy...) and also evaluated in the selective hydrogenation of butadiene.

3. Références / *References*

[1] A. J. McCue, J. A Anderson, *Frontiers of Chemical Science and Engineering* 9 (2015) 142-153.