

# MASTER INTERNSHIP M2 PPN (5 months)

2019-2020

**Title of the project: Study of a catalytic reaction for active pharmaceutical ingredients manufacturing followed by XPS and SIMS**

**Supervisor(s):** Dr Richard DECREAU (ICMUB) [richard.decreau@u-bourgogne.fr](mailto:richard.decreau@u-bourgogne.fr)  
Dr Olivier Heintz (ICB) [olivier.heintz@u-bourgogne.fr](mailto:olivier.heintz@u-bourgogne.fr)  
Coline Bernard-Nicod (ICB) [Coline.Bernard-Nicod@u-bourgogne.fr](mailto:Coline.Bernard-Nicod@u-bourgogne.fr)  
**Collaborations:** SON Company – [j.paris@synthesisofnanohybrids.com](mailto:j.paris@synthesisofnanohybrids.com)

## Summary:

Active pharmaceutical ingredient or API refers to the chemical substance that in a drug has a therapeutic effect. In the manufacture of API, catalysts are used to accelerate the reaction. These are very difficult to remove. Thus, traces of the catalysts can be found at the end of the reaction. The subject proposed concerns the evaluation of catalyst traces during the API manufacturing by XPS and SIMS.

The objective of this internship is:

- 1- Elaboration and characterization of new nanocatalyst (FTIR, XRD, TEM, ...).
- 2- Use of this nanocatalyst in catalysis reaction (C-C coupling)
- 3- XPS and SIMS characterization of nanocatalyst and API

XPS will be used to accurately determine the nature and amount of the chemical bonds of pure compounds used in reactions.

SIMS will be used for the first time in the laboratory on this type of material. It will therefore be necessary, in view of XPS results, to build a fingerprint database for the compounds involved.

Once these results have been obtained, the very high sensitivity of SIMS technique will be used to look for traces of catalysts on API surfaces.

The proposed internship is very applicative and directed towards experimental measurements. It will involve conducting specific experiments and understanding and formatting the results to in-fine write clear experimental protocols.

The subject is a joint work between the laboratory Interdisciplinaire Carnot de Bourgogne (ICB), the Institute of Molecular Chemistry (ICMUB) and the SON company.

**Type of project (theory / experiment): EXPERIMENT**

**Required skills: Aptitude for experimental work, autonomy, interest for chemistry**