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* :
X Chimie des Matériaux / *Materials Chemistry:*
☐ Ingénierie Chimique / *Chemical Engineering:*

Laboratoire d'accueil / *Host Institution*
Intitulés / *Name* : Laboratoire Sciences et Ingénierie de la Matière Molle (SIMM)
Adresse / *Address* : 10 rue Vauquelin, 75231 Paris Cedex05
Directeur / *Director (legal representative) :* Etienne BARTHEL
Tél / *Tel* : 01.40.79.44.22
E-mail : etienne.barthel@espci.fr

Equipe d'accueil / *Hosting Team : CAID Colloids Assemblies and Interfacial Dynamics*
Adresse / *Address :* 10 rue Vauquelin, 75231 Paris Cedex05
Responsable équipe / *Team leader* : Nicolas Sanson
Site Web *https://www.simm.espci.fr/-CAID-Colloides-Assemblages-et-Interfaces-Dynamiques-.html*
Responsable du stage (encadrant) / *Direct Supervisor : Nicolas Sanson, Patrick Perrin*
Fonction / *Position :* Maître de conférences, Professeur
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Période de stage / *Internship period* * : 01/02/2022-01/07/2022

Supramolecular Micro- and Macro- gels

Keywords:
Stimuli-responsive polymers, Supramolecular chemistry, Microgel

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

During the last three decades micro- and macrogels have received considerable interests for applications in many areas including material science, drug delivery, biosensors. Macrogels and microgels exhibit a 3D network structure that swells in a suitable solvent. Challenging research has been directed towards the chemical design of "stimuli-responsive" or "smart" micro/macro-gels which properties can be reversibly modulated in response to an environmental stimulus. To achieve this, both micro- and macrogels need to bear suitable chemical functions to target the desired properties in relation to applications. Within this framework, our research team is interested in the synthesis and functionalization of micro/ macrogel by supramolecular chemistry to control their swelling as well as their rheological/mechanical properties by changing their crosslinking density under stimulation.[1,2,3]

The project is thus structured around three cornerstones: (i) the synthesis and characterization of functionalized micro/macrogels using (mainly) conventional radical polymerization (ii) the

* 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).*

physicochemical characterization of the responsive gels depending on the chain environment (iii) the study of their properties in bulk and at interfaces.
Typically, the swelling and rheological/mechanical behavior of the gels will be investigated with respect to their microscopic structures, which can be changed under the action of various stimuli.

References
[1] J. Es Sayed, C. Lorthioir, P. Perrin, N. Sanson Soft Matter 2019, 15, 963.
[2] J. Es Sayed, C. Lorthioir, P. Banet, P. Perrin, N. Sanson Angewandte Chemie International Edition 2020, 59, 7042.
[3] J. Es Sayed, C. Meyer, N. Sanson, P. Perrin ACS Macroletters 2020, 9, 1040.

Techniques/methods in use: polymer synthesis, NMR, Size exclusion chromatography (SEC), UV-vis spectroscopy, swelling experiments

Applicant skills:
- General knowledge of polymer synthesis and characterization
- General knowledge of the physical chemistry of colloids
- Experimental skills
- Reporting and communication skills

Industrial partnership: No

Internship supervisor(s) (name, email, phone, webmail):
N. Sanson (nicolas.sanson@espci.fr), Patrick Perrin (patrick.perrin@espci.fr)
Internship location: Soft Matter Science and Engineering (SIMM) laboratory at ESPCI, a joint CNRS-ESPCI-SU laboratory, 10 rue Vauquelin 75005 Paris

Possibility for a Doctoral thesis: To be discussed