MASTER DE CHIMIE DE PARIS CENTRE - M2S4
Proposition de stage 2026-2027
Internship Proposal 2026-2027

Parcours type(s) / *Specialty(ies) :*

☐ Chimie Analytique, Physique et Théorique */ Analytical, Physical and Theoretical Chemistry*
X Chimie Moléculaire / *Molecular Chemistry*
☐ Chimie des Matériaux / *Materials Chemistry*
☐ Ingénierie Chimique / *Chemical Engineering*

Laboratoire d'accueil / *Host Institution*
Intitulés / *Name* : Institut Parisien de Chimie Moléculaire (IPCM) – UMR 8232
Adresse / *Address* : 4 place jussieu 75252 Paris cedex 5
Directeur / *Director (legal representative) :* Pr. Matthieu Sollogoub
Tél / *Tel* : 01 44 27 61 63
E-mail : matthieu.sollogoub@sorbonne-universite.fr

Equipe d'accueil / *Hosting Team :* Réactivité Organométallique et Catalyse pour la Synthèse (ROCS)
Adresse / *Address :* Tour 32/42 – 5ème étage, 4 place jussieu 75252 Paris cedex 5
Responsable équipe / *Team leader* : Dr. Alejandro Perez-Luna
Site Web / *Web site :* https://ipcm.fr/recherche/equipe-rocs/
Responsable du stage (encadrant) / *Direct Supervisor :* Dr. Olivier Jackowski
Fonction / *Position :* Maître de conférences
Tél / *Tel* : 01 44 27 92 64
E-mail : olivier.jackowski@sorbonne-universite.fr

Période de stage / *Internship period* * : 5 mois à partir du 25 janvier

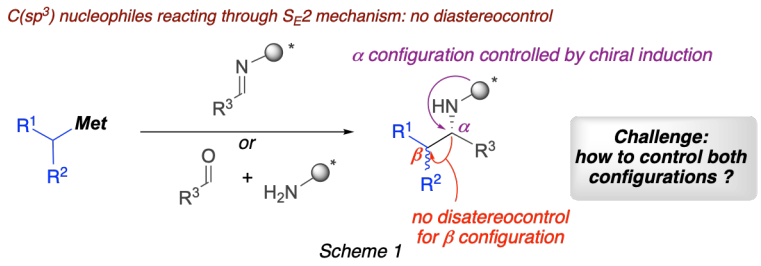
* **min. 5 mois, maximum 6 mois à partir du 25 janv 2027/** ***min. 5 months and max. 6 months not earlier than January, 25 th 2027.***
Fin des conventions de stage au plus tard le 15/07/2027 ou le 16/09/2027 et le 18 novembre 2027.
End of internship at the latest July 15, 2027 or September. 16, 2027 and 18 November, 2027.

Asymmetric α,β-disubstituted Amines by Dissociated Stereocontrol

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

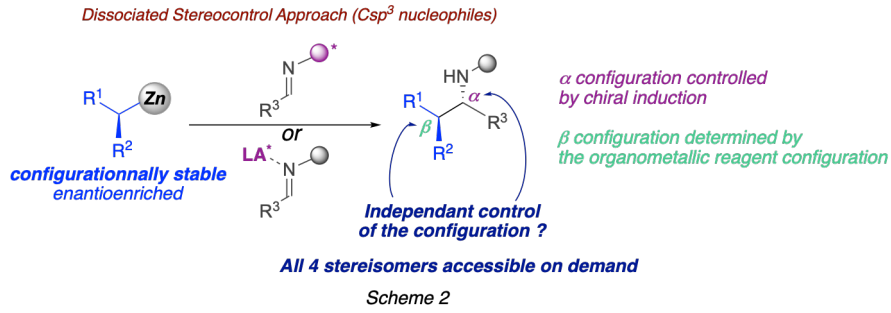
1. Description du projet / Description of the project

Achieving stereocontrol in enantioselective addition reactions to carbonyl derivatives, including Mannich-type reactions, wherein C–C bond formation is accompanied by the generation of two contiguous stereogenic centers (position α et β to N atom) remains a challenge in organic synthesis. The main problem is the absence of disatereoselection whereas the α-configuration is well-controlled (Scheme 1).[1] To address this issue, this project proposes to turn this lack of simple diastereoselection into an advantage by showcasing stereochemical dissociation of α and β stereocenters. We therefore envision to develop protocols wherein two stereoselective processes will operate independently to control the configuration of each new stereogenic center. This approach will be considered specifically for condensations between stereodefined organozinc reagents (which will promote the intrinsic β-configuration) and chiral imines (which will allow α-configuration to be established by stereofacial selectivity originating from stereoinduction), with the outermost goal of developing asymmetric multicomponent Mannich reactions (AMCRs) (Scheme 2).



Scheme 1

To reach this objective, the internship will be focused on both the preparation of stereodefined organozinc reagents (β-configuration) and their condensation to imines in the presence of enantiopure Lewis acid to induce α-configuration. The first goal will be studied based on literature backgrounds related to B to Zn transmetallation[2] and I to Zn exchange[3] that occur with retention of stereochemical information of the C—B or C—I bonds respectively. The condensation stage will be considered with the use of Zn or Mg/alcoholate complexes in which alcoholates are bidentate due to the presence of N atom or NHC motif.



Scheme 2

2. Techniques ou méthodes utilisées / Specific techniques or methods

All standard techniques and methods used in organometallic synthetic chemistry will be employed: the preparation and handling of organometallic compounds, reactions under an inert atmosphere, techniques for characterising organic products (NMR, IR, polarimetry, mass spectrometry, etc.), and methods for determining the optical purity of organic products (chiral HPLC, etc.).

3. Références / References

1. a) Hatano, M. *and al*. Highly Efficient Alkylation to Ketones and Aldimines with Grignard Reagents Catalyzed by Zinc(II) Chloride. *J. Am. Chem. Soc*. **2006**, *128*, 9998. b) Pinaud, M. *and al*. Mannich-Type Reactions of Alkylzinc Reagents*. Eur. J. Org. Chem.* **2023**, *26*, e202300572.

2. a) Liang, H. *and al*. Stereospecific Transformations of Alkylboronic Esters Enabled by Direct Boron-to-Zinc Transmetalation *J. Am. Chem. Soc*. **2023**, *145*, 9976. b) Collins, B. S. L. *and al*. Asymmetric Synthesis of Secondary and Tertiary Boronic Esters. *Angew. Chem. Int. Ed.* **2017**, *56*, 11700. c) Hu, J. *and al*. Recent Advances in Asymmetric Borylation by Transition Metal Catalysis. *Chem. Soc. Rev.* **2021**, *50*, 13129.

3. a) Berger, S. *and al*. b-Silyl Diorganozinc Compounds-A New Class of Useful Zinc Reagents *Angew. Chem. Int. Ed*. **1997**, *36*, 1496. b) Skotnitzki, J. *and al*. Stereoselective Csp^3—Csp^2 Cross-Couplings of Chiral Secondary Alkylzinc Reagents with Alkenyl and Aryl Halides *Angew. Chem. Int. Ed.* **2020**, *59*, 320.