18-month POST-DOC position

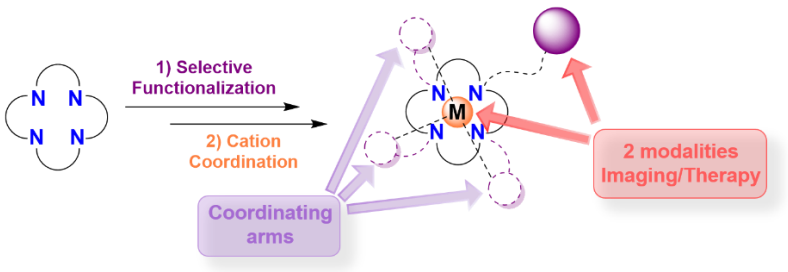
"Innovant Polyazamacrocycles for Bimodal Imaging and Theranostics Applications"

Project Description :

Nitrogen-containing macrocyclic compounds, because of their complexing abilities, are important targets in supramolecular and coordination chemistry.[i] Amongst them, polyazamacrocycles (Cyclen, cyclam, pyclen, tacn…) are renowned as efficient chelating agents for numerous metal ions.[ii] These macrocycles can be *N*-functionalized with various coordinating groups, which allows the preparation of a wide range of ligands suitable for many applications ranging from molecular recognition, catalysis, purification of liquids, to the development of metal-based imaging and therapeutic agents in medicine.[iii]

Our group develops tools for the selective functionalization of azamacrocycles,[iv] and investigates the coordination properties of the targetted ligands,[v] leading to their pre-clinical studies or industrial utilization[vi] through collaborations with our academic (C. Platas-Iglesias, *La Coruna*; O. Maury, *ENS Lyon*; L. Charbonnière, *Strasbourg;* A. Faivre-Chauvet, *Nantes;* and others) and industrial (Guerbet, Easychelators, Fluidigm, Necsa…) collaborations.

In this project, new chelating agents will be designed from polyazamacrocycles, bearing innovant functional groups in addition to usual coordinating arms, to allow strong cation coordination and applications as bimodal agents in medical imaging and therapy: one modality will be held by the central cation (^{64}Cu for PET, ^{67}Cu for therapy, Gd for MRI…) and the other by the the side-arm functional group (PET, MRI, therapy…)



The work will consist, first, in the preparation of the desired macrocyclic ligands, through usual organic/inorganic synthesis (including inert atmosphere manipulations), then in the study of their coordinating abilities with electrochemical and spectroscopic techniques, prior to the use of the selected complexes in pre-clinical investigations.

Candidate profile :

- Molecular chemist with expertise in organic synthesis and physico-chemical characterization
- Experience in inorganic synthesis, schlenk line and glovebox techniques, electrochemical techniques is also valuable
- Knowledge of bioapplications, in particular Medical Imaging and Therapy
- CANDIDATES MUST HAVE SPENT AT LEAST 12 MONTHS ABROAD IN THE LAST 3 YEARS (MANDATORY)

Details :

- Supervisors : Dr Thibault Troadec and Pr. Raphaël Tripier, COSM Group (Organic Chemistry for Health and Materials [website]), Université de Bretagne Occidentale, Brest (France)
- Dates : January 2018-June 2019 (18 months)
- Financial Support : S.A.D. Program (Region Bretagne)
- Salary : ≈ 2200 €/month
- Procedure : send a detailed CV, cover letter and 2 references at thibault.troadec@univ-brest.fr **and** raphael.tripier@univ-brest.fr
- Limit Date : December 10th 2017

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[i] R. M. Izatt, K. Pawlak and J. S. Bradshaw, *Chem. Rev*., **1995**, 95, 2529; DOI: 10.1021/cr00039a010

[ii] E. K. Barefield, Coord. *Chem. Rev*., **2010**, 254, 1607 ; DOI : 10.1016/j.ccr.2010.03.007

[iii] R. Delgado, V. Felix, L. M. P. Lima and D. W. Price, *Dalton Trans*., **2007**, 2734. DOI: 10.1039/B704360K

[iv] (a) N. Camus, Z. Halime, N. Le Bris, H. Bernard, C. Platas-Iglesias, R. Tripier, *J. Org. Chem*., **2014**, 79, 1885 ;
(b) Le Fur, M.; Beyler, M.; Molnár, E.; Fougère, O.; Esteban-Gómez, D.; Tircsó, G.; Platas-Iglesias, C.; Lepareur, N.; Rousseaux O. and Tripier, R., *Chem. Commun*., **2017**, 53, 9534-9537, DOI: 10.1039/C7CC05088G ;
(c)Le Fur, M.; Beyler, M.; Le Poul, N.; Lima, L.M.P.; Le Mest, Y.; Delgado, R.; Platas Iglesias, C.; Patinec V. and Tripier, R. ; *Dalton Trans*., **2016**, 45, 7406-7420, DOI: 10.1039/C6DT00385K.

[v] (a) Rodríguez-Rodríguez, A.; Esteban-Gómez, D.; Tripier, R.; Tircso, G.; Gyula; Garda, Z.; Toth, I.; De Blas, A.; Rodriguez-Blas, T.; Platas-Iglesias, C.; *J. Am. Chem. Soc*., **2014**, 136 (52), 17954-17957, DOI: 10.1021/ja511331n
(b) Liu, T.; Nonat, A.; Beyler, M.; Regueiro-Figueroa, M.; Nchimi Nono, K.; Jeannin, O.; Camerel, F.; Debaene, F.; Cianférani-Sanglier, S.; Tripier, R.; Platas-Iglesias, C.; Charbonnière, L. J. *Angew. Chem. Int. Ed*, **2014**, 53, 29, 7259-7263, DOI: 10.1002/anie.201404847

[vi] (a) Bui, A.-T.; Beyler, M.; Liao, Y.-Y.; Grichine, A.; Duperray, A.; Mulatier, J.-C.; Le Guennic, B.; Andraud, C.; Maury, O.; Tripier, R. *Inorg. Chem*., **2016**, 55 (14), pp 7020–7025, DOI: 10.1021/acs.inorgchem.6b00891.
(b) Halime, Z. ; Frindel, M.; Camus, N.; Orain, P.-Y. ; Lacombe, M.; Chérel, M.; Gestin, J.-F. ; Faivre-Chauvet A.; Tripier, R. ; *Org. Biomol. Chem*., **2015**,13, 11302-11314, DOI: 10.1039/C5OB01618E.