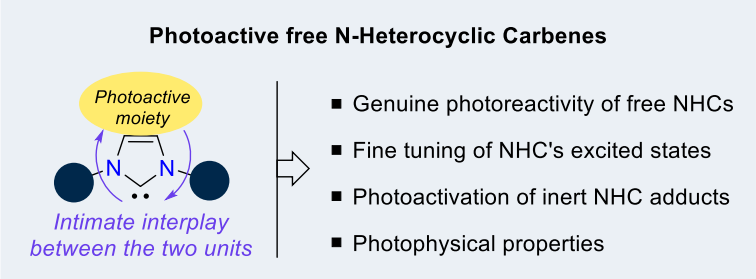
PhD position – 36 months – 2026-2029

Photoactive N-Heterocyclic Carbenes: Synthesis and unconventional Reactivity

Supervision: Dr Vincent César, Dr Dmitry Valyaev; Co-supervision: Dr Olivier Baslé

Project description: Beyond their extensive applications in different areas of chemistry and homogeneous catalysis,[1] ***N*-heterocyclic carbenes (NHCs)** have recently become key components in the design of highly efficient luminescent transition metal complexes.[2] By contrast, photo-induced transformations of free NHCs are extremely rare and require high-energy UV irradiation.[3] Furthermore, no viable examples of free carbenes with luminescent properties have been reported in the literature. Our team recently developed a synthetic approach to the imidazolium salts incorporating conventional organoboron and transition metal chromophores in the ligand backbone.[4] Upon deprotonation these compounds can be transformed to the first examples of stable luminescent imidazol-2-ylidenes that show a strong absorption in the visible region. The objectives of the PhD project are to develop novel photoactive NHCs and explore **unprecedented photochemical reactivity** of these unique species towards the activation of small molecules and inert chemical bonds beyond classical free NHC reactivity. The ultimate goal of the project is to develop new photocatalytic transformations useful for organic synthesis.



Work environment: The work will be carried out in a stimulating, dynamic and international environment at the Laboratoire de Chimie de Coordination du CNRS (LCC-CNRS) in Toulouse, France, as part of the "Molecular Design of Transition Metal Catalysts" group. This PhD position is funded by the ANR through the project PhotoCarb.

Profile: The candidate should have a strong background in organic and organometallic chemistry, along with a high level of motivation to engage in an interdisciplinary project combining synthesis, characterization, photophysical, and theoretical studies. He/she must be proficient in working under controlled atmosphere conditions with air- and moisture-sensitive compounds. Curiosity, autonomy, and strong experimental skills are expected. The candidate should demonstrate the ability to work collaboratively in an interdisciplinary environment and possess excellent written and oral communication skills in English (minimum B2 level).

How to apply: Application must be submitted on the following website: https://emploi.cnrs.fr/Offres/Doctorant/UPR8241-VINCES-004/Default.aspx

The application must include: *i*) a detailed CV, *ii*) a cover letter, *iii*) the master's marks, *iv*) the contact details of at least two referees able to issue a reasoned opinion on the applicant.

References

[1] M. N. Hopkinson, C. Richter, M. Schedler, F. Glorius, *Nature* **2014**, *510*, 485.
[2] a) H. Amouri, *Chem. Rev.* **2023**, *123*, 230; b) C. Wegeberg, O. S. Wenger, *JACS Au* **2021**, *1*, 1860.
[3] a) T. A. Perera, E. W. Reinheimer, T. W. Hudnall, *J. Am. Chem. Soc.* **2017**, *139*, 14807. b) T. A. Perera, W. V. Taylor, M. B. Gildner, E. W. Reinheimer, S. Ito, A. Nelson, S. R. Yost, T. W. Hudnall, *Chem. Sci.* **2023**, *14*, 7867; c) A. J. Teator, Y. Tian, M. Chen, J. K. Lee, C. W. Bielawski, *Angew. Chem. Int. Ed.* **2015**, *54*, 11559.
[4] A. Das, A. Rysich, P. Lambert, L. Vendier, A. Pensel, P.-A. Bouit, D. Jacquemin, N. Lugan, O. Baslé, V. César, D. A. Valyaev, manuscript in preparation.

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