



CATALYTIC AND ORGANOCATALYTIC PROCESSES

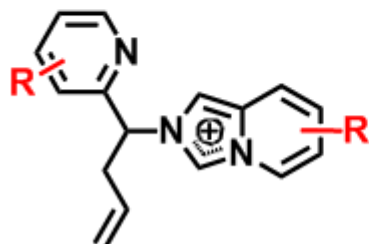
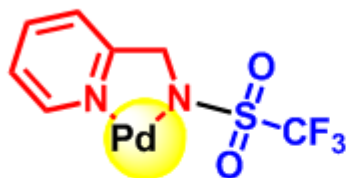
The **Catalysis** theme perfectly integrates into one of the priority areas of the LabEx Charm3at (Université Paris Saclay), which has allowed us to establish fruitful new collaborations with partners within this network, but also more widely throughout the Ile-de-France scientific community, or with associates of other LabEx. Three major topics in catalysis are being explored: **organometallic catalysis**, **organocatalysis** and **photocatalysis**.

Synthesis, characterisation and reactivity studies of innovative catalytic systems

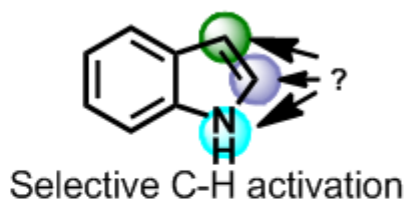
A family of ligands containing the pyridylmethylamine group were shown to be very polyvalent, allowing the formation of C-C and C-O bonds by metal catalysis (Pd, Cu, Yb, Zn). The first examples of heterogeneous catalysis on biopolymer supports were described. These multi-purpose ligands are capable of creating a non-racemic

environment around protons. They have been used in organocatalysis and in mixed catalytic cascade processes, proving the « relay ligand » concept.

Catalytic systems

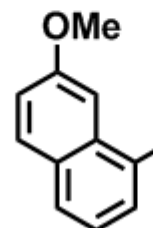


Applications



Organocatalyzed
C=O activation

Multic



Recent publications

Eur. J. Org. Chem. **2017**, 746 ([link](#))

Org. Biomol. Chem. **2017**, 15, 3298 ([link](#))

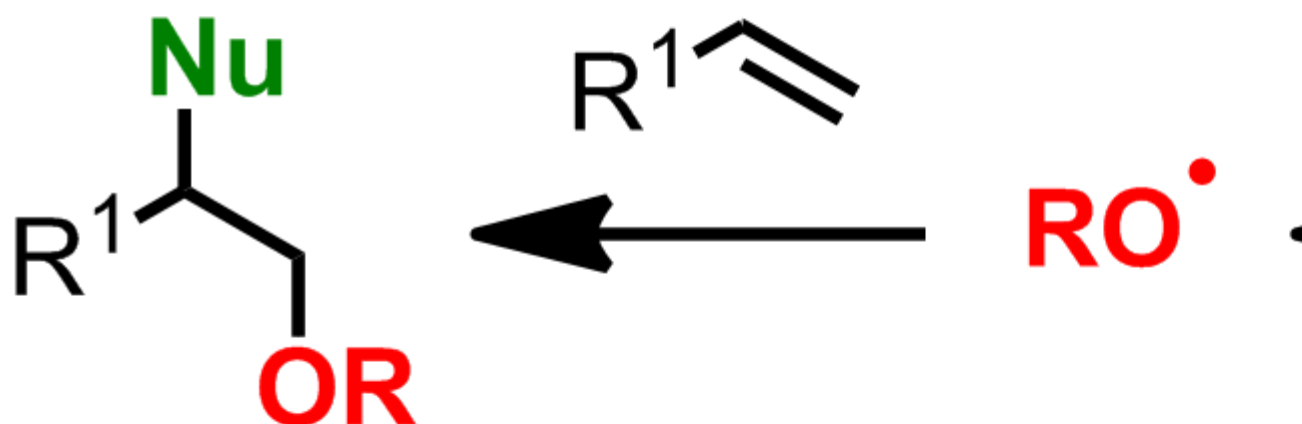
ChemCatChem **2017**, 9, 389 ([link](#))

ChemCatChem **2016**, 8, 2455 ([link](#))

Generation of new synthetic intermediates by photocatalysis

Photoredox catalysis consists of using visible light to generate radical species in a controlled way, under very mild and eco-compatible conditions. In our laboratory, this powerful tool has been successfully applied to the formation of trifluoromethyl $\bullet\text{CF}_3$, perfluoroalkyl $\bullet\text{RF}$, and trifluoromethanethyl $\bullet\text{SCF}_3$ radicals, which then allowed the synthesis of many interesting organofluorine compounds (cf. Theme 2: Fluorinated compounds). Other radical species are currently being investigated, notably alkoxy $\text{RO}\bullet$

radicals generated from N-alkoxypyridinium salts.



**Nu = OH, OR,
NHAc**

Recent publications

Angew. Chem. Int. Ed. **2018**, 57, 13790 (link)

Angew. Chem. Int. Ed. **2017**, 56, 3997 (link)

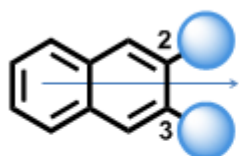
Chem. Eur. J. **2017**, 23, 4282 (link)

Org. Lett. **2016**, 18, 2906 (link)

Development of original catalytic methods for the synthesis of complex molecular architectures

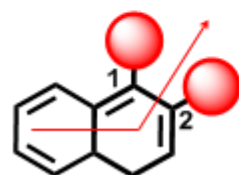
The design of efficient reaction sequences which can generate the formation of several chemical bonds in one step is a useful approach to synthesize rapidly complex and varied molecular structures. With this aim, new domino reactions relying on organo- or photocatalytic approaches for the synthesis of functionalised polycyclic architectures have been developed over the last few years.

C-H activation for extended architectures

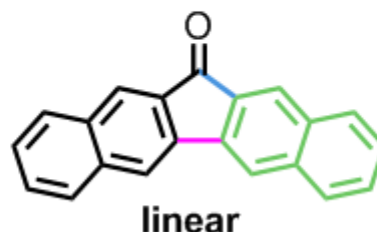


Linear extension

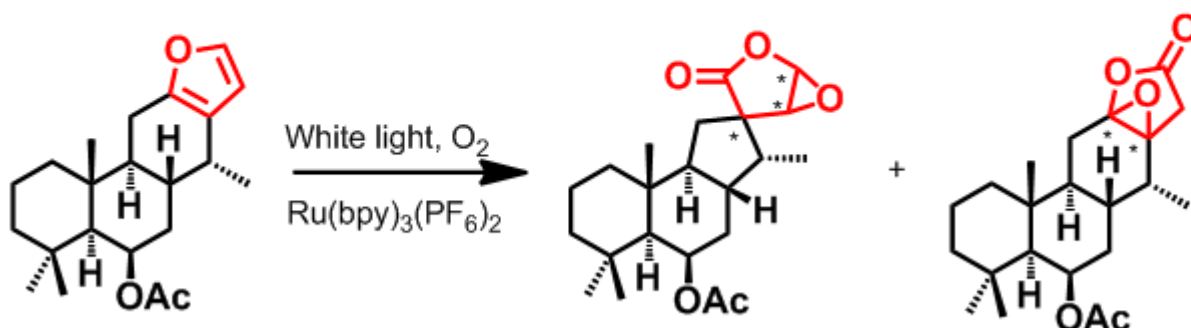
Pd-Cat. C-H arylation / H⁺ cyclisation



Angular extension



Photocatalysed oxidative rearrangements



Recent publications

J. Org. Chem. **2018**, *83*, 1019 (link)

Org. Lett. **2018**, *20*, 792 (link)

Synthesis **2017**, *49*, 532 (link)

New. J. Chem. **2017**, *41*, 7337 (link)

Org. Biomol. Chem. **2016**, *14*, 2828 (link)

J. Org. Chem. **2016**, *81*, 6855 (link)