Chimiste organicien

Gaétan ARCHER

Objectif

Docteur/ingénieur en chimie organique à la recherche d'une deuxième expérience

Expérience

Octobre 2024 – Septembre 2025
Postdoctorant *Chimie organique*
ICR, Aix-Marseille Université, Marseille (13).
Sous la direction des Drs Anne Doriane Manick et Didier Gigmes
Addition radicalaire énantiosélective d'alcoxyamines sur les oléfines.
Conduite de projets de recherche scientifique en autonomie.

Janvier 2021 – Décembre 2023
Doctorant *Chimie organique*
ICBMS, Université Claude Bernard, Villeurbanne (69).
Sous la direction des Drs Maurice Médebielle et Jérémy Merad
Génération d'organocatalyseurs radicalaires par voie photorédox
Conduite de projets de recherche scientifique en autonomie.

Février 2020 – Août 2020
Stagiaire recherche *Chimie organique*
ICIQ, Université Rovira i Virgili, Tarragone (Espagne).
Sous la direction du Prof Paolo Melchiorre et du Dr Benjamin Laroche
Alkylation photochimique chimiosélective de peptides contenant le tryptophane.
Participation à un projet de recherche scientifique dans un environnement international

Mars 2019 – Août 2019
Stagiaire recherche *Chimie organique*
Inventiva Pharma, Daix (21). Sous la direction du Dr Olivia Poupardin
Synthèse d'une bibliothèque d'indole à visée thérapeutique.
Expérience de l'exigence de la recherche en milieu industriel.

Diplômes

Décembre 2023
Doctorat *Chimie organique*
Université Claude Bernard (Lyon)

Octobre 2020
Master *Chimie moléculaire*
Université PSL (Paris)

Octobre 2020
Diplôme d'ingénieur *Chimie*
ENSCP – Chimie ParisTech (Paris)

Juillet 2014
Baccalauréat *Scientifique*
Mention très bien
Lycée de Beauregard (Montbrison)

Compétences

Français : Langue maternelle

Anglais : Autonome (C1)

Espagnol : Utilisateur indépendant (B2)

Permis B

Sapeur-Pompier Volontaire : Sapeur 2e classe

Intérêts

CrossFit, Force athlétique

Informations

28 ans

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Productions scientifiques

Communications orales :

Nov 2022 **Journées de la Chimie Organique de la Société Chimique de France**

Ecole Polytechnique, Palaiseau (91)

Nov 2024 **Journées Méditerranéennes des Jeunes Chercheurs**

Palais du Pharo, Marseille (13)

Posters :

Juin 2023 **Journée de Printemps de la Division Rhône-Alpes de la Société Chimique de France**

CPE Lyon, Villeurbanne (69)

Articles et Chapitres :

2021 **Photochemical Chemoselective Alkylation of Tryptophan-Containing Peptides** (Communication)

Benjamin Laroche, Xinjun Tang, Gaétan Archer, Riccardo Di Sanza, Paolo Melchiorre*

Organic Letters **2021**, *23*, 285-289

We report a photochemical method for the chemoselective radical functionalization of tryptophan (Trp)-containing peptides. The method exploits the photoactivity of an electron donor-acceptor complex generated between the tryptophan unit and pyridinium salts. Irradiation with weak light (390 nm) generates radical intermediates right next to the targeted Trp amino acid, facilitating a proximity-driven radical functionalization. This protocol exhibits high chemoselectivity for Trp residues over other amino acids and tolerates biocompatible conditions.

2022 **Photoredox Generation of Isothiouronyl Radical Cations: A New Platform in Covalent Radical Catalysis** (Communication)

Gaétan Archer, Pierre Cavalère, Maurice Médebielle, Jérémy Merad*

Angewandte Chemie International Edition **2022**, *61*, e202205596

Thiyl radicals offer unique catalytic patterns for the direct covalent activation of alkenes. However, important limitations in terms of structural diversity and handling have hampered the routine use of thiyl radicals in covalent radical catalysis. Herein, we report a new class of cationic sulfur-centered radicals to achieve covalent radical catalysis. Their generation from highly modular thioureas by photoredox catalysis make their utilization very simple and reliable. The synthetic potential and the versatility of the catalytic system were finally evaluated in a (3+2)-radical cascade between vinylcyclopropanes and olefins.

2023 **Merging Organocatalysis and Photocatalysis: A New Momentum in Covalent Radical Catalysis** (Concept article)

Gaétan Archer, Kunlong Song, Maurice Médebielle, Jérémy Merad*

ChemPhotoChem **2023**, *7*, e202300096

The use of free radicals as organocatalysts constitutes a powerful strategy to activate and functionalize unsaturated carbon chains. Indeed, the unique affinity of open-shell species for alkenes and alkynes can be rerouted to achieve the catalytic covalent activation of the substrate and control a subsequent radical cascade. However, the field of covalent radical catalysis has remained challenging for decades due to important issues in terms of catalyst handling, reaction design and viability. Recently, these pitfalls have been addressed one by one by the use of photocatalysis to control the generation and the reactivity of radical catalysts. This Concept article aims to highlight recent achievements in the field of photocatalyzed covalent radical catalysis and the perspectives offered by such catalytic combinations. The reaction mechanisms and the interconnection between the catalytic cycles are reviewed with the hope of demonstrating the synthetic potential of this approach and foster a rapid growth of this nascent topic.

2024 **Photoredox-catalyzed α-C-H mono-alkylation of symmetric light polyols under CO_2 atmosphere** (Full article)

Gaétan Archer, Ricardo Meyrelles, Isabel Eder, Nóra Kovács, Boris Maryasin *, Jérémy Merad*

Angewandte Chemie International Edition **2024**, *63*, e202315329

The catalytic mono-functionalization of symmetric poly-hydroxylated compounds is a challenging task due to the multiplicity of identical active sites. Here, we describe a new strategy to achieve the catalytic α-C-H mono-alkylation of symmetric light polyols, wherein the catalytic reversible carbonation of the substrate under CO_2 atmosphere, modulates the reactivity of its different C-H bonds toward hydrogen atom transfers (HAT). Mechanistic and computational studies demonstrate that the establishment of an intramolecular hydrogen bond between the transient carbonate and the free alcohol is responsible for the kinetic and thermodynamic activation of one alcohol. The ternary catalytic system designed in purpose includes a photoredox catalyst, a HAT promotor and a carbonation catalyst and proceeds with an exquisite selectivity for mono- versus poly-alkylations from a range of unprotected light polyols while delivering valuable building blocks in short reaction times.

2024 **4.12 - Asymmetric Dual Catalytic Processes: Organocatalysis and Photoredox Catalysis** (Book chapter)

Gaétan Archer, Abderrahman Amgoune, Jérémy Merad

Comprehensive Chirality, second edition **2024**, 210-235

This chapter aims at giving a complete overview of synthetic processes relying on merging photoredox catalysis and enantioselective organocatalysis to access valuable enantio-enriched products and building blocks. The synthetic potential of such dual catalytic systems is highlighted through an organization by disconnection and activation strategies.