

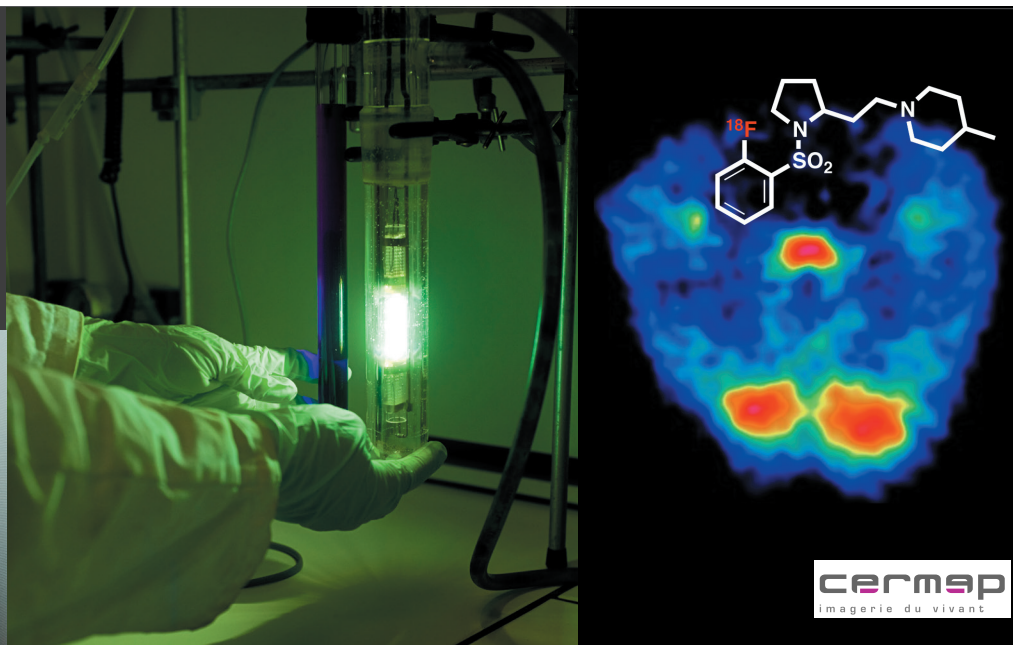
GROUP

SYNTHESIS, USE AND REACTIVITY OF ORGANIC AND ORGANOFLUOROUS COMPOUNDS (SURCOOF)

ICBMS - UMR 5246, UNIVERSITÉ CLAUDE BERNARD LYON 1 - CNRS - INSA LYON - CPE LYON

OLIVIER PIVA

Professor



In the SURCOOF group, we are interested in the development of new methods for the selective formation of C = C, C-O, C-H or C-F bonds by the way of reactions catalyzed by metals (Ru, Pd, Fe,...) but also by chiral organic additives (organocatalysis).

The second main topic concerns the application of these methodologies to the synthesis of natural products possessing biological activities (and more particularly those isolated from the Oceans).

Access to fluorocompounds possessing one single fluorine atom, a CF₃ or a CF₃X group (X = S, O, N) is successfully achieved by the way of anionic, cationic or radical reagents. Our laboratories located in Raulin Building, have been recently (2009) and nicely refurbished.

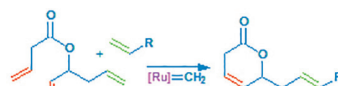
TOPICS

Methodologies in organic synthesis – Total Synthesis of Natural Products – Catalysis – Organofluorine Chemistry – Metathesis – New Oxidation Processes – Photochemistry Organocatalysis – Tandem Reactions – Medicinal chemistry – Radiochemistry – Medical Imaging.

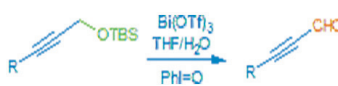
ORGANIC AND ORGANOFLUORINE CHEMISTRY

Catalysis plays a crucial role in organic reactions. We have studied for example:

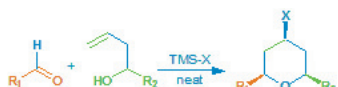
- Tandem metathesis reactions



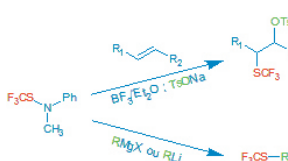
- Eco-friendly oxidative processes



- Solvent-free Prins reaction



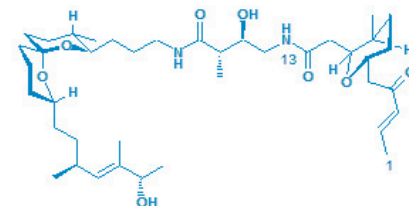
- Powerful synthesis of CF₃ derivatives



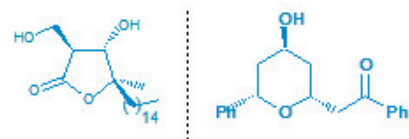
NATURAL PRODUCT SYNTHESIS

We have recently achieved the multi-step synthesis of different well-defined target molecules as well as structural analogues which could be tested through the CNRS compounds library.

Bistramide A: In collaboration with the group of Prof. P. Goekjian in Lyon.



Amphisterin BA and Diospongine A:



Figures

Center: Photochemical reactor

Right: ¹⁸F PET radiotracer

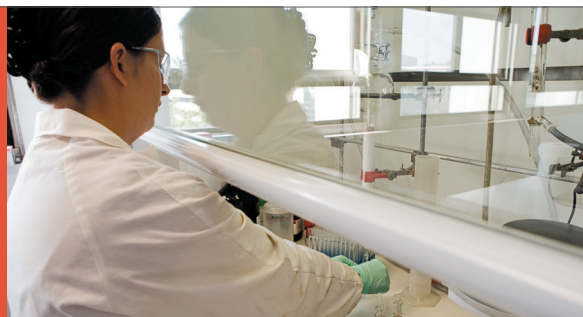


| EQUIPMENT

- > 23 New Fume hoods.
- > Analysis : FT-IR, HPLC, Polarimeter...
- > Autoclaves for hydrogenation
- > Cryostat (-80°C)
- > Photo-reactors with different UV sources (Rayonet system).

| EXPERTISES

- > Catalysis: Metathesis, oxidations,...
- > Natural Product Synthesis
- > Medicinal Chemistry
- > Fluorine Chemistry
- > Photochemistry
- > Organocatalysis



PHOTOCHEMISTRY

In the context of sustainable chemistry, photochemical reactions represent attractive processes for the access to uncommon structures (cyclobutanes, oxetanes). Our group has recently developed transannular cycloadditions but also devised enantio- and diastereoselective photo-isomerisations with direct applications in total synthesis.

PET

Syntheses of Positron Emission Tomography (PET) radiotracers for medical imaging are performed with labeled fluororous compounds. Their potential uses for diagnostic of neurodegenerative diseases are evaluated in a close collaboration with CERMEP in Lyon. In particular, our group has recently described the first ^{18}F labeled PET radiotracers for 5-HT_7 receptors imaging.

COLLABORATIONS

We have partnerships with some chemical companies as well as with academic teams in Lyon and in other French universities. A fruitful collaboration with «CERMEP-In vivo imaging» and the «Lyon Neuroscience Research Center» led to the development

of new important compounds in the field of medical imaging, in particular for the diagnosis of neurodegenerative diseases

RECENT PUBLICATIONS

Methodologies:

- Synlett 2011, 2048-2052.
- Synthesis, 2011, 4037-4044.
- Chem. Commun. 2012, 48, 157-159.

Natural product synthesis:

- J. Org. Chem. 2009, 74, 2257-2260.
- Org. Lett. 2012, 14, 564-567.
- Chem. Eur. J. 2012, 18, 7452-7466.

Fluorine chemistry:

- Angew. Chem. Int. Ed. 2009, 48, 8551-8555.
- Angew. Chem. Int. Ed. 2012, 51, 10382-85.

Medical imaging:

- Eur. J. Med. Chem. 2011, 46, 3455-2461.
- J. Nucl. Med. 2012, 53, 969-976.

STAFF

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2-4 Graduate Students

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