

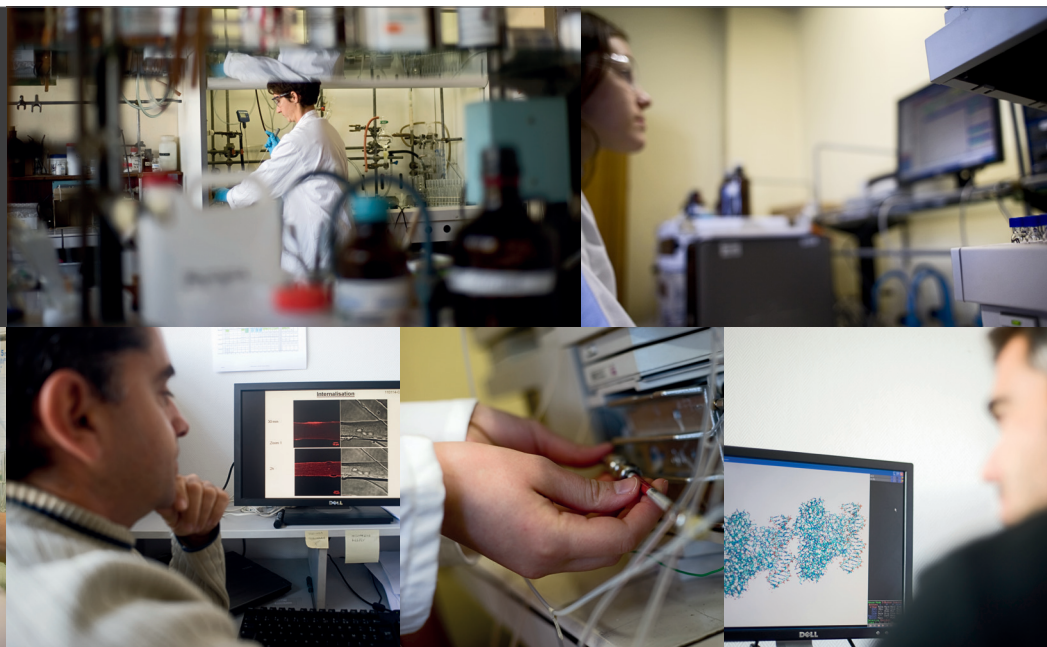
| GROUP

## ORGANIC AND BIOORGANIC CHEMISTRY (COB)

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

YVES  
QUENEAU

CNRS Research Director



**The Organic and Bioorganic Chemistry laboratory of INSA Lyon aims at developing synthetic methodology towards molecules of biological relevance as well as innovation towards biobased chemicals. It participates in multidisciplinary projects with biologists, materials chemists and physical chemists. The team belongs to the Biosciences Department of INSA Lyon, a higher-education engineer school located on the La Doua Campus of the University of Lyon in Villeurbanne ([www.insa-lyon.fr](http://www.insa-lyon.fr)). It is part of ICBMS, a 9-team synthetic chemistry and biochemistry research and teaching unit working under the authority of CNRS, University Lyon 1, INSA Lyon and CPE Lyon ([www.icbms.fr](http://www.icbms.fr)).**

### TOPICS

Biobased chemicals, synthons, ligands and materials – Carbohydrate chemistry – Heterocyclic chemistry towards enzyme inhibitors – Bacterial Quorum sensing modulation – Fluorescent probes – Biocompatible agrochemicals – Lipids of biological interest.

### METHODOLOGY TOWARDS BIOLOGICALLY ACTIVE MOLECULES

Interfacing with biologists, research is dedicated to the design of specific molecular targets able to tackle biological and health issues such as enzyme inhibition, modulation of bacterial phenotype expression, antiparasitic activity, membrane imaging or plant diseases.

Once the molecular target is defined, possibly helped by molecular modeling investigations (docking studies, virtual screening), comes the stage of the elaboration of new synthetic strategies which should offer easy structural variations, widening the chances for providing significant information able to establish structure-activity relationships.

Methodological projects aiming at inventing innovative synthetic approaches towards new chemical architectures is also part of the work achieved in the COB-INSA team. Explorative investigations are in particular developed in the fields of heterocyclic chemistry and carbohydrate chemistry.

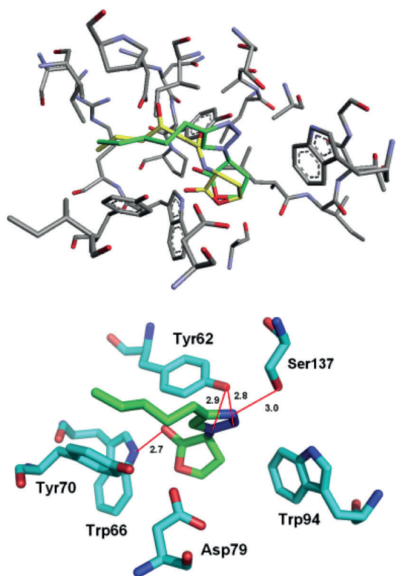
### CATALYST DESIGN

Nature offers a wide range of structures able to serve as starting materials for designing new molecules. In particular, carbohydrates which are very available and cheap, can be transformed into various types of molecules. Being first an opportunity for adding value to agricultural crops, this has become nowadays a real challenge in terms of resource for the chemical industry. Applications range from low- or medium-added value products such as surfactants or polymers, to more elaborated systems such as organocatalysts or molecular scaffolds for fine chemistry. This research is conducted in close collaboration with downstream users, either academic or industrial partners.

### RESEARCH CHALLENGES

Research challenges include:

- Innovative synthetic methodologies
- Design of molecular targets
- Elaboration of synthetic strategies
- Structural characterization.
- Preparation of ultra-pure samples for biological or physico-chemical evaluation
- Interpretation of biological activities through molecular modelling studies.

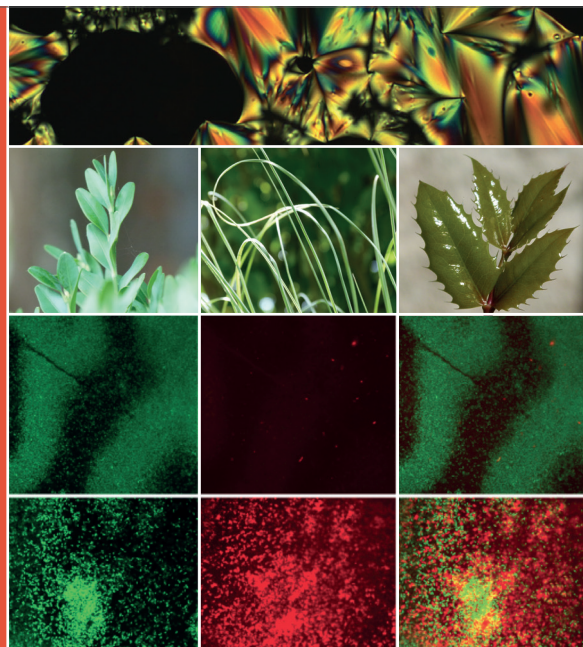


#### | EQUIPMENT

- › HPLC with UV and RI detection
- › Molecular modeling workstation
- › Synthetic organic chemistry labs
- › within ICBMS: Mass spectrometry, IR, UV
- › within the ICL/department: NMR, XRD

#### | EXPERTISES

- › Carbohydrate chemistry
- › Heterocyclic chemistry
- › Design of biologically active compounds
- › Molecular modeling
- › Bio-based chemistry
- › Lipids and glycolipids



## COLLABORATIONS

The COB-INSA team is involved in multidisciplinary projects with laboratories of biology, physical chemistry, materials sciences, and in joint projects with other synthetic chemistry labs, in the context of national and international collaborations (UK, China, India, Chile, Poland, Portugal). It develops partnerships with several chemical and pharmaceutical companies. It is also involved in IMBL and the Institut Carnot LISA, two structures dedicated to the biology, biochemistry and the chemistry of lipids.

## KEYWORDS

Carbohydrates – heterocycles – lipids – glycolipids – quorum sensing – fluorescent probes – liquid crystals – surfactants – enzyme inhibitors – bioagrochemicals. green, sustainable chemistry – bio-based chemistry – bioresources.

## PUBLICATIONS

The team publishes in international journals of organic chemistry and related sciences. Full list is available on the website [www.icbms.fr](http://www.icbms.fr).

## STAFF

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**Mohammed Ahmar**, CNRS Research Assistant  
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**Lucie Grand**, Technician  
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**Laurent Soutère**, Assistant Professor

*PhD, graduate students, post-docs: 10*

#### | Figures

*Left: Molecular modelling view of Quorum Sensing inhibitors within the receptor active site*

*Right, up: Polarised light microscopic view of liquid crystalline glycolipids;*

*Right, middle: bioresources: renewable starting materials for chemistry*

*Right, down: modulation of Quorum Sensing controlled bacterial biofilm adhesion on metal surfaces*

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