



➔ The Bio-Inspired Chemistry and Ecological Innovations Laboratory, known as 'ChimEco', takes an interdisciplinary approach to global ecology and green chemistry as a vector for sustainable development.

- Its originality lies in the unusual combination of the environment, ecology and bio-inspired chemistry fields.
- The approach is based on a breakthrough innovation, ecocatalysis;
- The ecological solutions developed on a large scale are phytoextraction, rhizofiltration and biosorption.
- ChimEco meets a set of exacting standards rarely achieved in green chemistry, but also integrates the notions of eco-responsibility, green and circular economy.



Research teams involved with IM2E

Team name: Ecology and Bio-inspired Chemistry

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Team name: Ecological Restoration

Led by:

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Team name: Environmental Chemical Analysis

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Team name: Ecocatalysis

Led by:

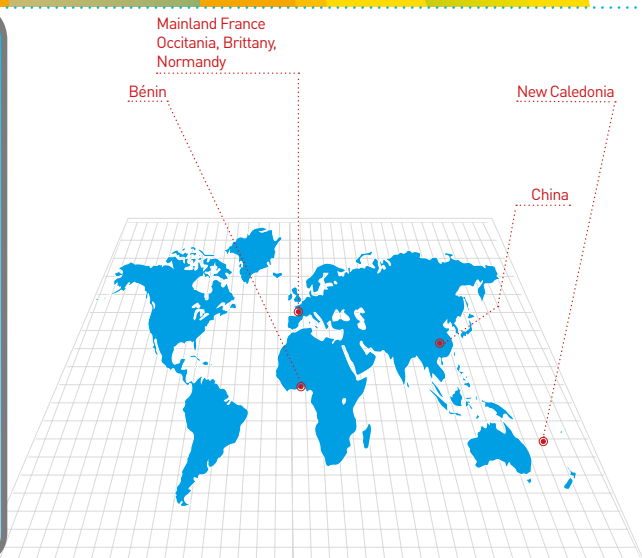
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Area of excellence: development of a new system to clean up effluents contaminated by metallic elements.

- **Innovation:** the process is bio-inspired and patented (CNRS). It consists of a plant filter where the materials are functionalised
- **Environmental efficiency:** the process is adaptable to endemic and invasive aquatic plants. It meets WHO standards
- **Objectives:** to stop the dispersion of polluted water in regions subject to climatic hazards, to avoid the formation of undesirable industrial sludge, to valorise eco-materials used in an innovative sustainable chemical process.



Picture : SUEZ France

highlights

Scientific and/or technical

● From the concept of bio-inspiration to the reality on the ground

Ecocatalysis is built around a new concept, global ecology, which combines reflection and action:

- 6 major ecological rehabilitation projects inspired by nature
- the eco-design of a new system capable of creating new products and processes that take advantage of the specificities of phytoremediation (phytoextraction, rhizofiltration, biosorption) and the resources generated;
- an original fundamental corpus based on numerous bio-inspired catalysis results
- the creation of a new sector able to ensure rational and useful management of phytoremediation while actively contributing to the achievement of concrete environmental objectives and on sites

● Nature as a source of innovation

Ecocatalysis has created a paradigm shift: biomass from ecological clean-up is no longer contaminated waste but a natural restoration system with high added value.

● Invasive or useful species

ChimEco transforms invasive plant species into natural tools for the depollution of aquatic systems and innovation in sustainable chemistry

● Thesis topic:

From phytoextraction in New Caledonia to Eco-Mn: a structural study of bio-based and innovative catalysts (Claire Garel).

● Thesis topic:

Bio-inspired industrial water treatment in critical areas (Kenza Richards)

● Thesis topic:

Ecocatalysis and phytoaccumulation: a new vision of industrial green chemistry (Camille Bihanic)

Platforms and technologies

The ecology of depollution: natural decontamination and ecological rehabilitation techniques

Environmental chemical analyses: mineral analyses of soils, water, biomass, catalysts, natural products, etc.

Bio-inspired catalysis: design, synthesis and fine study of bio-sourced catalysts inspired by natural mechanisms

Green and sustainable chemistry: eco-responsible, eco-designed organic synthesis based on the use of abundant and renewable natural resources

Preparation of bio-inspired active ingredients

Reducing the environmental footprint of processes



Academic, public and industrial partners

France

- Klorane Botanical Foundation
- Compagnie Nationale du Rhône
- Nymphaea
- Nereus
- Chemdoc
- GBN
- Pôle Axelera
- CEEBIOS
- Synchrotron Soleil
- Région Occitanie
- Ineris
- ANR
- ADEME
- EPTB Gardons
- SMGV

international

- International : Suez
- Société Le Nickel
- Koniambo Nickel SA
- Pôle Aquavalley
- Colas
- Eurovia



Examples of partnership projects

Winning project of the Suez Foundation:

> Sustainable and controlled management of polluted waters exposed to climatic hazards by depollution at source of waters contaminated by climatic elements using ecological, bio-inspired and recoverable technologies

Partnership with the Occitania Region:

> Bio-inspired treatment of industrial water in critical areas. Development of filtration columns filled with natural and functionalised materials to retain polluting metallic elements from mining waters

Partnership with Klorane Botanical Foundation

> Study of the purifying properties of *Mentha aquatica* in relation to polluted aquatic ecosystems in the département of Gard

ChimEco keywords

Water Quality
Biodiversity
Remediation
Ecocatalysis
Innovation
Natural Capital
Bio-inspiration
Industrial ecology
Sustainable Solutions
Nature

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