Institut Européen des Membranes

Aims & Objectives

➔ The European Institute of Membranes (IEM) looks at water from two perspectives: developing specific membranes using new materials (organic and/or inorganic), and assessing how these membranes can be incorporated into processes, either alone or as coupled and/or multi-functional processes (membrane bioreactor, enzymatic membrane reactor, advanced oxidation, adsorption).
The main purpose is to ensure the effectiveness of the separation, the concentration, or the extraction and purification of pre-identified compounds and molecules.

➔ Our core expertise centres around developing, identifying, quantifying and modelling the basic processes that govern separation and reaction operations in aqueous media.

Linkage with IM2E research fields and emerging issues

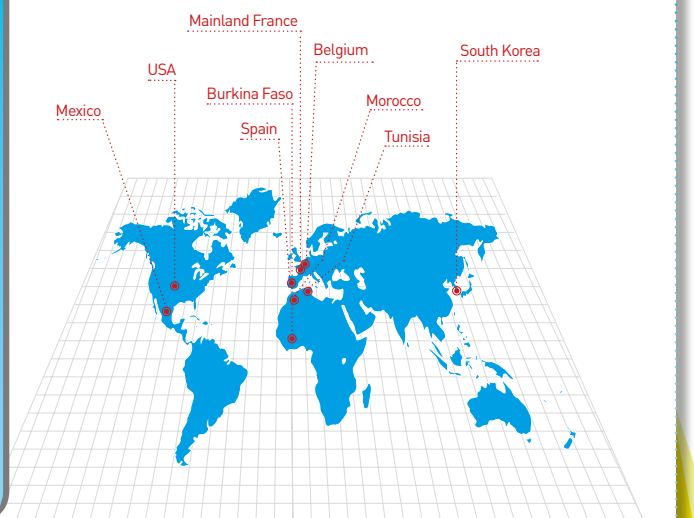
The majority of the institute's work comes under IM2E discipline 3 **(Metrology and innovative treatment processes)**.

In terms of **water treatment processes**, the institute focuses primarily on urban and industrial effluents.

Its projects focus on building knowledge around wastewater reuse, improving water quality, reducing energy use and the applications of **green chemistry.**

It researches **innovative technologies** from a comprehensive, multi-scale perspective, working in a bottom-up manner from **materials to processes.**

Study areas



Research teams involved into IM2E

Team
Membrane Process Engineering (GPM)

Led by:

Denis BOUYER
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Team
Interface, Chemical Physics, Polymers (IP2)

Led by:

Marc CRETIN
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Team
Design of Membrane Materials and Multifunctional Systems (DM3)

Led by:

Samuel BERNARD
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Cross-cutting research area Water research area

Led by:

Marc HERAN
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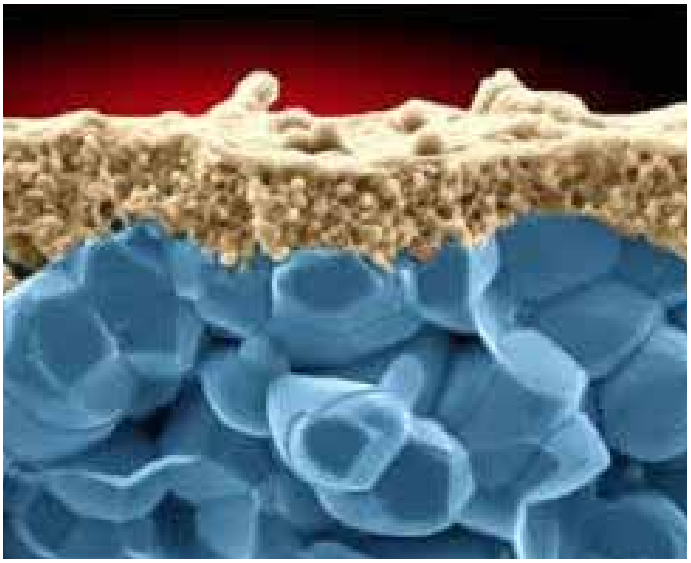

Picture: cut of a membrane

highlights

Scientific and/or technical

- **Thesis topic:**

How to tune Dissolved Organic Matter characterization in MBR processes to understand membrane fouling.

PhD. JACQUIN Céline

- **Thesis topic:**

Developing electrode materials for water treatment through electrochemical advanced oxidation and nanofiltration.

PhD. ESMILAIRE Roseline

- **Thesis topic:**

Enzymatic degradation of an antibiotic pool by Pycnoporus sanguineus (CS43).

PhD. GUARDADO Ana Luisa

- **Thesis topic:**

TiO2 growth on natural fibres to produce a membrane for photo-decontamination of water.

PhD. PLUMEJEAU Sandrine

Platforms and Equipments

IEM has its own technology platform managed by research engineers and technicians.

The platform focuses on the design and production of laboratory-scale pilot and the corresponding instruments. Meanwhile, the platform apparatus are centred around:

1. The membrane materials characterization (MEB, texture analysis, vibrational spectroscopy, x-ray diffraction, etc.).
2. The understanding of interactions between materials and processes (thermogravimetric analysis, light diffusion, interaction analysis, etc.).
3. This platform gives researchers the methodological support and tools they need to carry out innovative scientific and technological work.

Academic and industrial partners

France

- LGC Toulouse,
- Université Paul Sabatier.
- Université Marne La Vallée
- Université d'Aix Marseille
- Da Volterra,
- Solvay,
- CIRSEE
- Saint Gobain
- Société Actibio
- BFG Europe
- Suez environnement
- Véolia
- SAUR
- TOTAL

Europe

- ChiralVision (Pays bas),
- c-LEcta (Allemagne).

International

- INHA University (South Korea).
- Michigan State University (USA).
- The Catalan Institute for Water Research (ICRA) (Espagne).
- Department of Aquatic Ecotoxicology, Goethe Frankfurt.
- University (Allemagne).
- Instituto Technologico de Monterrey (Mexique).
- Los Andes University (Venezuela).
- Chlef University (Algérie)

Examples of partnership project

ANR CElectrON project

Effluent treatment using electro-oxidation and nanofiltration :

>The CElectrON project aims to develop an innovative new technology – combining membrane separation, nanofiltration and an advanced oxidation process (electro-Fenton process) – to promote sustainable water management.

ANR POLPHARMA project (2015-2018)

Enzymatic degradation of an antibiotic pool and carbamazepine.

>Innovative process using nanostructures to eliminate emerging micro-pollutants in aqueous effluents.

FIU CARBIOSEP project

Mobile, regenerable biological treatment and separation cartridges.

>This onboard wastewater treatment solution is a true environmental breakthrough, promoting sustainable development, boosting energy efficiency, reducing energy use, and removing the need for chemical products.

IEM keywords

Treatment
Molecular engineering
Water treatment
Membrane materials
Membranes
Bioreactors
Elaboration
Membrane distillation
Intensification
Processes
Photocatalytic membranes
Desalination
Membrane contactor

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