

SCIENTIFIC PORTFOLIO

Membrane technologies for water treatment and resource recovery

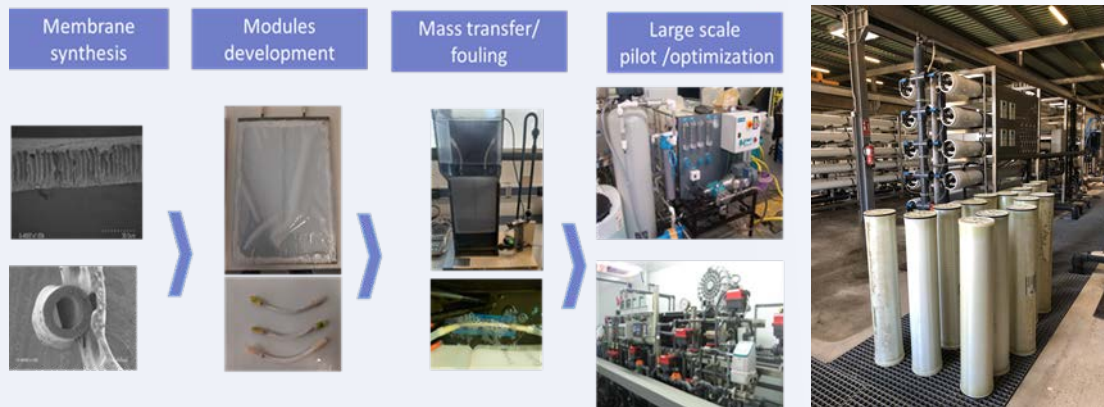
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Name of the scientists in charge

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Technology description

- > Basic and applied research for a better understanding of membrane-based processes and their application for wastewater treatment/reuse and desalination. Improvement of design, operation and control of membranes systems.



Research expertise

Expertise:

- Membrane fouling and clogging: from basic research of the responsible parameters to practical aspects for cleaning and monitoring.
- Membrane characterization (bench scale filtration tests, physical characterization,...).
- Modelling and simulation.
- Fate of micropollutants.
- Development and validation of decision support systems.
- Use of MBR for waste gases treatment.

Membrane technologies:

- Membrane bioreactors (MBR): for wastewater treatment /grey water treatment and reuse, and integrated systems (with NF/RO)
- Forward osmosis: as concentration and purification steps for water reuse and desalination (from bench scale to pilot scale, cross flow and submerged systems)
- Reverse osmosis membranes (RO): recycling of RO membranes for water treatment and validation in full-scale facilities.
- Decentralized membrane purification systems for remote area and emergencies.
- MF/UF/NF/RO membranes: characterization, fouling propensity, pilot scale validation from lab

Most relevant projects

- > **FORWARD-FACTORY** - Implementation of forward osmosis to transform urban wastewater treatment in resource recovery factory. La Caixa Foundation- Postdoctoral junior retaining leader program- 2021-2024.
- > **DECEMEM** - REnd-cap: sustainable membrane technology for decentralized areas. AGAUR. Innovadors program. 2020-2021.
- > **REGIREU** - Recerca en tecnologies de regeneració d'aigua i gestió del risc per la reutilització. ACCIÓ. Comunitat "RIS3Cat Aigua". 2017-2021.
- > **Mem 2.0** - Integration of recycled membranes in water processes. ACCIÓ – TECNIOSPRING program (MSC Cofund). 2018-2020.
- > **SSAMBRA** – Strengthening Smart Air MBR Applications. ACCIÓ – TECNIOSPRING program (MSC Cofund). 2015-2017.

Most relevant publications

- > Blandin G., Galizia A., Monclús H., Lesage G., Héran M., Martínez-Lladó X., Submerged osmotic processes: Design and operation of hollow fiber forward osmosis modules, *Desalination*, Volume 51815, December 2021, Article number 115281.
- > García-Pacheco R., Li Q., Comas J., Taylor R.A., Le-Clech P., Novel housing designs for nanofiltration and ultrafiltration gravity-driven recycled membrane-based systems, *Science of the Total Environment*, Volume 7671, May 2021, Article number 144181.
- > Galizia A., Mamo J., Blandin G., Verdaquer M., Comas J., Rodríguez-Roda I., Monclús H., Advanced control system for reverse osmosis optimization in water reuse systems, *Desalination*, Open Access, Volume 51815, December 2021, Article number 115284.
- > Senán-Salinas J., García-Pacheco R., Landaburu-Aguirre J., García-Calvo E., Recycling of end-of-life reverse osmosis membranes: Comparative LCA and cost-effectiveness analysis at pilot scale, *Resources, Conservation and Recycling*, Volume 150, November 2019, 104423.
- > Santos-Clotas E., Cabrera-Codony A., Comas J., Martín M.J., Biogas purification through membrane bioreactors: Experimental study on siloxane separation and biodegradation, *Separation and Purification Technology*, Volume 2381, May 2020, Article number 116440.
- > Blandin, G., Gautier, C., Sauchelli Toran, M., Monclús, H., Rodríguez-Roda, I., Comas, J., Retrofitting membrane bioreactor (MBR) into osmotic membrane bioreactor (OMBR): A pilot scale study, *Chemical Engineering Journal*, Volume 339, 1 May 2018, Pages 268-277.

Patents

- > **Real time control of MBRs** (Spanish Patent ES2333837), 50% UdG 50% GS INIMA.
- > **Operation of OMBRs** (European Patent ES2333837), 85% UdG 15% ICRA.

Collaborations

We collaborate with the "Technologies and Evaluation" area of the Catalan Institute for Water Research (ICRA).