# RESEARCH PORTFOLIO

Drinking water treatment

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## Name of scientists in charge


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## Technology description

Optimization of drinking water treatment processes to increase their efficiency, sustainability and resilience through the application of different scientific and technological disciplines such as artificial intelligence, analytical chemistry, chemical engineering and environmental assessment. Assessment of technical, environmental and social feasibility of potable water reuse.

*Pilot plant for drinking water treatment optimization*

*Advanced Analytical laboratory for drinking water characterization*

*HPSEC-DAD-OCD equipment*

## Research expertise

**Drinking water treatment processes:**

- Coagulation
- Pre-oxidation
- Ozonation
- Filtration: cartridge, multi-media, membrane (MF, UF, NF, RO)

**Research expertise:**

- Natural organic matter (NOM) fractioning by HPSEC-DAD-OCD, UV-VIS254 and Fluorescence
- Prediction and minimization strategies for disinfection byproducts
- Environmental decision support systems to optimize drinking water treatment processes
- Predictive modelling for chemical risk mitigation


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## Projects

**MORIARTY** - Bridging the Water Gap: A Step Forward in Multifaceted Risk Evaluation in Supply Scenarios with Regenerated Water. Spanish National Research Agency AEI. Call: Proyectos de Generación de Conocimiento. Ref: PID2024-155733OB-I00. 2025-2028.

**WaterCLUE** - Online Sensing and Digitalization of Drinking Water Supply Systems for Timely Mitigation of Chemical and Microbial Risks. Spanish National Research Agency AEI. Call: Consolidación Investigadora. Ref CNS2023-143664. 2024-2026.

**ShERLOcK** - A StEp forward in the ResiLient management Of DrinKing Water Utilities. From applied research to full-scale validation. Spanish National Research Agency AEI. Call: Retos I+D+I. 2021-2024. Ref: PID2020-112615RA-I00.

**Industrial Doctorates** projects funded by the Catalan Research Agency AGAUR: "Design and operation strategies for the minimisation of disinfection by-products in drinking water treatment processes - Ens d'Abastament d'Aigües Ter-Llobregat (2023-2026)" and "Development of artificial intelligent tools for digitalization of decision-making processes in L'Ampolla DWTP - Consorci d'Aigües de Tarragona (2024-2027)".

## Publications


David Abert-Fernández, Ester Aguilera, Pere Emiliano, Fernando Valero, Hèctor Monclús, **Beyond point predictions: Quantifying uncertainty in E. coli ML-based monitoring,** *Journal of Water Process Engineering (2025)*, 78, 108734.

Valenti-Quiroga, M., Cabrera-Codony, A., Emiliano, P., Valero, F., Monclús, H., Martín, M.J., **In-depth analysis of natural organic matter fractions in drinking water treatment performance: Fate and role of humic substances in trihalomethanes formation potential,** *Science of the Total Environment (2024)*, 9541, 176600.

Valenti-Quiroga, M.; Daunis-i-Estadella, P.; Emiliano, P.; Valero, F.; Martin, M.J. **NOM fractionation by HPSEC-DAD-OCD for predicting trihalomethane disinfection by-product formation potential in full-scale drinking water treatment plants**, *Water Research* (2022), 227, 119314.

Suquet J.; Godo-Pla L.; Valentí M.; Ferràndez L.; Verdaguer M.; Poch M.; Martín M.J.; Monclús H. **Assessing the effect of catchment characteristics to enhanced coagulation in drinking water treatment: RSM models and sensitivity analysis,** *Science of the Total Environment (2021)*, 79910, 149398.

Godo-Pla, L.; Rodríguez, J. J.; Suquet, J.; Emiliano, P.; Valero, F.; Poch, M.; **Control of primary disinfection in a drinking water treatment plant based on a fuzzy inference system,** *Process Safety and Environmental Protection (2021),* 145, 63 – 70.

Godo-Pla L.; Emiliano P.; Poch M.; Valero F.; Monclús H., **Benchmarking empirical models for THMs formation in drinking water systems: An application for decision support in Barcelona, Spain**, *Science of the Total Environment* (2021), 7631, 144197.

Godo-Pla, Lluís, Emiliano, P.; González, S.; Poch, M.; Valero, F.; Monclús, H., **Implementation of an environmental decision support system for controlling the pre-oxidation step at a full-scale drinking water treatment plant**, *Water Science and Technology* (2020), 81, 8, 1778 – 1785.

Suquet, J.; Godo-Pla, L.; Valentí, M.; Verdaguer, M.; Martín, M. J.; Poch, M., **Development of an environmental decision support system for enhanced coagulation in drinking water production**, *Water (Switzerland)* (2020), 12, 2115.


## Software

**DrinkIA – Digital Twin®** technology is a decision support system to optimize drinking water treatment plants' operation from an integrated approach and to address the main demographic, climate and health challenges of their management.


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