

Technology Transfer portfolio

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Technology transfer is a key pillar of LEQUIA activity. In addition to the high number of RDI projects and technology transfer contracts, our researchers are inventors or several patents and co-founders of two spinoff companies: SISTLTech (2003) and Ecomemb (2022).

Expertise

Adsorption and oxidation processes
Anammox autotrophic nitrogen removal
Membranes for water treatment and resource recovery
Microbial electro-synthesis
Phosphorous recovery from wastewater
Socio-natural systems
Water digitalization and application of AI to the urban water cycle
Water (electro)-bioremediation
Water nature-based solutions

Applications

Biogas upgrading
Carbon dioxide bioconversion
Drinking water treatment
Groundwater bioremediation
Purification of indoor air
Resource recovery from wastewater
Wastewater treatment
Water governance
Water systems decentralisation



Pilot plat for the electro-bioconversion of carbon dioxide



Recycling of membranes for water treatment

Patented technologies

Membrane arrangement and corresponding assembly method. Universitat de Girona and Institut Català de Recerca de l'Aigua. Inventors: R. García-Pacheco, J. Comas, P. Le-Clech, L. Qiyuan. EP3858470B1.

Bioelectrochemical system for water treatment. Universitat de Girona. Inventors: J. Colprim, M.D. Balaguer; S. Puig, N. Pous. EP2925679B1.

Bioprocess for the production of elongated carboxylic acids. Universitat de Girona. Inventors: P. Dessì, S. Puig, M. Romans, M.D. Balaguer, WO2024256436A1.

Daphnia reactor for wastewater treatment. Universitat de Girona, Inbrooll Ind S.L. Inventors: V. Salvadó, T. Serra, J. Colomer, N. Pous, M. Font, I. Pijoan, J. Scheerer. ES1234189U.

Software

DrinkIA – Digital Twin®. Decision support system to optimise drinking water treatment plants' operation from an integrated approach and to address the main demographic, climate and health challenges of their management.

Fuzzy Smart Air MBR®. Smart fuzzy logic automated control system that monitors membrane bioreactor filtration process in wastewater treatment plants to optimise the air-scouring flow and reduce energy demand.

Biological and chemical processes for wastewater treatment and resource recovery

Precipitation of (k-)struvite for phosphorous recovery
Anammox and partial nitrification to remove nitrogen from wastewater.
Panammox® process to treat landfill leachates
Membrane-based fermentation for middle chain carboxylic and alcohols production

Multidisciplinary research on drinking water treatment optimisation

Drinking water treatment processes: coagulation, pre-oxidation, ozonation and filtration
Natural organic matter fractioning using HPSEC-DAC-OCD, UV-VIS254 and fluorescence
Prediction and minimisation strategies for disinfection by-products
Predictive modelling for chemical risk mitigation
Environmental Decision Support Systems to drinking water treatment optimisation

Adsorption and oxidation processes

Adsorption on porous materials for air, gas and water treatment
Advanced oxidation processes (Fenton-like systems, ozone and UV radiation)
New strategies to obtain porous carbon adsorbents from waste materials
Coupling of adsorption and oxidation technologies to biological systems

Membranes for water treatment and resource recovery

Membrane technologies: reverse osmosis, nanofiltration, microfiltration, forward osmosis, electro dialysis, membrane distillation, membrane bioreactors.
Membrane fouling and clogging
Membrane and modules fabrication
Membrane characterisation (bench scale filtration tests, physical characterisation)
Modelling and simulation
Fate of micropollutants

Microbial electro-technologies for carbon dioxide conversion and water remediation

Electro-bioremediation of polluted waters
Electro-bioconversion of CO₂ into added value compounds
Biogas upgrading by electro-methanogenesis
Electricity-driven isolation of microbial protein
Micro-plastics electro-biodegradation

Water digitalisation and application of AI to urban water cycle

Multi-criteria Environmental Decision Support Systems integrating knowledge management, artificial intelligence, and conventional modelling to improve the management of complex water-related systems
Agent-based modelling for user-centered water management
Digital twins for the optimization of water systems
Modelling of water treatment processes with computational fluid dynamics
Decision support systems for membrane process control

Socio-natural systems

Study of the ethic and political dimensions of technologies: values, perceptions, narratives, acceptances
Urban planning, circular economy and water nature-based solutions within the environmental justice
The hydro-social cycle: decision-making and conflicts associated with urban water cycle and its governance
Vulnerability to droughts and floods, participative planning and multi-criteria analysis