

ECO-INNOVATIVE WATER SOLUTIONS

[®] **lequia**
UdG

Report 2011 - 2013

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Dr Jesús Colprim Galceran

LEQUIA Group Leader

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INTRODUCTION

Welcome to the new edition of the report on activities developed by LEQUIA, a research group of the Institute of the Environment at the University of Girona. This report reflects LEQUIA's activity from 2011 to 2013, a three-year period characterised by challenging experiences and the improved productivity of all LEQUIA members.

Since the early 1990s, LEQUIA has overcome local difficulties to develop basic and applied research and achieve progress around the world in several fields of water science and technology. During the period 2011–13, despite the financial and economic crisis that stunned the world economy, LEQUIA consolidated itself as a reference research group in Catalonia, Spain and Europe. In that sense, we have strengthened our research ties with key water science and technology players from around the world, especially through strategic collaboration with the Catalan Institute for Water Research (ICRA) .

When dealing with a dynamic research group, an activities report is limited by its “time to print” date. Some of the PhD students have become experienced researchers, and are working in research groups around the world, carrying out research in the industrial sector or developing their scientific CVs with us. I have had the pleasure of presenting the LEQUIA report as group leader since July 2013. Previously, Professors Manel Poch (1995–2013) and Miquel Rigola (1989–1995) had made great efforts to start LEQUIA's activities and define the basic research lines that have led to the current level of excellence. I trust this report will briefly summarise our activities and that any future contact with us will generate positive results.

Although the next pages will give you a reasonable view of LEQUIA, know that the personal and scientific perspectives of LEQUIA members will provide a more detailed impression of who we are and what we do.

Sincerely,

A handwritten signature in blue ink, appearing to read 'J. Colprim', written over a circular scribble.





WHO WE ARE

The Laboratory of Chemical and Environmental Engineering (LEQUIA) is a research group of the University of Girona (UdG) devoted to the development of eco-innovative water solutions.

LEQUIA is part of the UdG's Institute of the Environment (IMA) and participates actively in the Euro-Mediterranean Tourism and Water Campus of International Excellence (e-MTA).

LEQUIA is a consolidated research group (SGR) recognised by the Catalan Government and a TECNIO centre. TECNIO is a network that brings together leading experts in applied research and technology transfer in Catalonia.

The team

LEQUIA has a team of 40 people, including university professors, post-doctoral and pre-doctoral researchers, and technical and management support staff. Because our work is multidisciplinary, LEQUIA projects often involve environmental scientists, chemists, biologists, engineers and computer scientists.

Research lines

- > Design, operation and control of advanced processes for the biological treatment of urban and industrial wastewaters
- > Valorisation of resources within the water-energy nexus
- > Environmental decision support systems (EDSS)
- > Advanced adsorption/oxidation processes for the treatment of gas and liquid effluents

Projects

Research activity is carried out with funds from national and international R&D projects, and technology transfer contracts with public and private organisations. Between 2009 and 2013, LEQUIA had an average turnover of 1.1 million euros (of which, 24% came from private funds).

Post-graduate education

LEQUIA professor Dr Marilós Balaguer has been the coordinator of the UdG's Master's in Water Science and Technology since its creation. LEQUIA's PhD students study in the Doctoral Programme in Experimental Sciences and Sustainability, which has received a quality award from the Spanish Ministry of Education, Culture and Sport, and in the recently created Doctoral Programme in Water Science and Technology.

FACILITIES



Pilot plant: granular reactors



Pilot plants (Science Park)

The group is based in the Faculty of Sciences of the UdG (Montilivi Campus) and a 550m² area in the Jaume Casademont building of the UdG's Science and Technology Park. Available facilities and equipment include:

- > Fully instrumented pilot plants with different configurations for wastewater treatment at laboratory and semi-industrial scale.
- > Instruments to follow-up and control wastewater treatment plants.
- > Analytical chemistry laboratory with generic and specific equipment for water characterisation.
- > Photoreactors for advanced oxidation processes.
- > Software for environmental modelling and life cycle assessment studies (LCA).
- > Access to the UdG's technical services, including analytical techniques such as ICP-MS, RMN, elemental analysis, XRD, XRF, SEM and TEM microscopy, GC-Ms, HPLC, MS and TGA.



Laboratory of Research (Faculty of Sciences) [↗](#)



Laboratory of Chemical Analysis [↗](#)



Fermentation of syngas: pilot plant [↗](#)



PANAMMOX® process: pilot plant [↗](#)



SBR pilot plant [↗](#)



> Permanent staff

January 2014



Dr Jesús Colprim Galceran

Associate Professor and LEQUIA Group Leader
j.colprim@lequia.udg.cat

Resource recovery from wastewaters. Struvite recovery from digested sludges. Partial nitrification/anammox processes. Aerobic granular sludge. Sludge reduction by decoupling oxidation-reduction metabolism. Bioelectrochemical systems (BES) for wastewater treatment, nitrate removal, CO₂ capture and transformation to valuable products. Biological syngas fermentation to produce butanol.



Dr Marilós Balaguer Condom

Full Professor
marilos@lequia.udg.cat

Biological nutrient removal for wastewater treatment: control and operation. Combined partial nitrite oxidation and anammox process to treat high ammonium concentration from wastewater. Granular

systems for biological nutrient removal: granulation process, microbial dynamic and operation. Design and operation of bioelectrical systems (BES) to treat domestic and industrial wastewater and polluted groundwater. Microbial electrolysis cells (MEC) to produce added value products from carbon dioxide emissions.



Dr Joaquim Comas Matas

Associate Professor
quim@lequia.udg.cat

Multi-criteria decision support tools for environmental systems. Sustainable and integrated management of urban water systems (sewer system, wastewater treatment plant and receiving

media). Qualitative modelling, life cycle assessment and water footprint of urban water systems. Modelling and control of wastewater treatment technologies. Membrane integrated systems (membrane bioreactors coupled with RO/NF) for water reuse. Removal of emerging pollutants in wastewater systems.



Dr Maria Martín Sánchez

Associate Professor
maria@lequia.udg.cat

Use of sewage sludge as adsorbent/catalyser for odour-causing compounds removal. Development of new adsorption and regeneration techniques through advanced

oxidation processes for liquid and gaseous effluents. Removal of siloxanes and trace compounds in biogas.



Dr Manel Poch Espallargas

Full Professor
manel@lequia.udg.cat

Development and application of decision support systems in the field of environmental technology. Sustainable management of conventional and advanced wastewater collection and

treatment systems. River basin management. Selection and operation of natural systems for wastewater treatment. Urban water cycle integrated control (sewer system, sewage treatment plant, river).



Dr Sebastià Puig Broch

Assistant Professor
sebastia@lequia.udg.cat

Bioelectrochemical Systems (BES) for 1) biofuels and value added production from wastes (liquid and gas-phase); 2) bioenergy production during wastewater treatment, and 3) bioremediation of contami-

nated waters. Bio-Leading edge technologies for the treatment and nutrient (nitrogen, phosphorus, magnesium and potassium) recovery (struvite) of wastewaters.



Dr Ignasi Rodríguez-Roda Layret

Full Professor
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Membrane bioreactors. Micropollutants removal in water and wastewater. Modelling and simulation of microbiology related solids separation problems in the activated sludge system.

Wastewater treatment technologies. Water reuse. Closing water cycle in touristic facilities. Environmental Decision Support Systems. Selection of alternatives and conceptual design of wastewater treatment plants.



> Post-doctoral / senior researchers

January 2014



Dr Alba Anfruns Bagaria

Part-time post-doctoral researcher
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Volatile Organic Compounds removal using advanced adsorption / H₂O₂-based oxidation processes.



Dr Erika Fiset

Post-doctoral researcher
erika.fiset@lequia.udg.cat

Carbon electrode materials for bioelectrochemical systems (BES).



Dr Ramon Ganigué Pagès

Post-doctoral researcher
ramon.ganigue@lequia.udg.cat

Fermentation processes for the production of biofuels and other commodity products.



Dr M^a Jesús García Galán

Post-doctoral researcher
chus.garcia@lequia.udg.cat

Pharmaceuticals removal during advanced MBR + RO/NF treatment. Detection and structural elucidation of AOPs transformation products of target pharmaceuticals.



Dr Rafael González Olmos

Post-doctoral researcher
rafael.gonzalez@lequia.udg.cat

Research on wastewater treatment (advanced oxidation processes, biological processes and adsorption), biogas upgrading (Adsorption and Bioelectrochemical systems) and CO₂ conversion into high added products (Bioelectrochemical systems).



Dr Fungisai Matemadombo

Post-doctoral researcher
fungisai.matemadombo@lequia.udg.cat

Electrochemical characterization of microbial electrosynthesis cells (MES) for the production of added value products using CO₂ as a feed-stock.



Dr Hèctor Monclús Sales

Post-doctoral researcher
hector.monclus@lequia.udg.cat

Decision support system (DSS) for the integrated control of membrane bioreactors (MBR). Critical tests for evaluation of new module membranes for urban systems. Indicators for MBR optimization and monitoring. Technological transfer on new tools for MBR optimization.



José Porro

Experienced researcher Marie Curie
jose.porro@lequia.udg.cat

Environmental decision support systems (EDSS) and qualitative modelling applied to urban water systems.



Dr Maël Ruscalleda Beylier

Post-doctoral researcher
mael.ruscalleda@lequia.udg.cat

Autotrophic nitrogen removal by nitrification/anammox processes, N₂O production mechanisms and mitigation in BNR. Struvite recovery from industrial wastewater.



Dr Marta Verdaguer Planas

Post-doctoral researcher
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Environmental Decision Support Systems (EDSS) applied to urban wastewater systems.



> Pre-doctoral researchers

January 2014



Pau Batlle Vilanova

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Doctoral thesis: Production of value added products from CO₂ in bioelectrochemical systems.

Supervisors: Dr Jesús Colprim, Dr Sebastià Puig and Dr Rafael González.



Alba Cabrera Codony

alba.cabrera@lequia.udg.cat

Doctoral thesis: Siloxane removal for biogas upgrading: adsorption and regeneration by advanced oxidation processes.

Supervisors: Dr Maria Martín and Dr Rafael González.



Alba Castillo Llorens

alba.castillo@lequia.udg.cat

Doctoral thesis: Environmental Decision Support Systems (EDSS) applied to the selection of wastewater treatment technologies. Industrial doctorate with Aqualogy.

Supervisor: Dr Manel Poch.



Montserrat Dalmau Figueras

montserrat.dalmau@lequia.udg.cat

Doctoral thesis: Development and validation of integrated control strategies for MBR.

Supervisors: Dr Ignasi Rodríguez-Roda and Dr Joaquim Comas.



Jordi Gabarró Bartual

jordi.gabarro@lequia.udg.cat

Doctoral thesis: Effects of operational conditions on the performance of a partial nitrification SBR treating high nitrogen loads.

Supervisors: Dr Marilós Balaguer, Dr Jesús Colprim and Dr Maël Rusalleda.



Sara Gabarrón Fernández

sara.gabarron@lequia.udg.cat

Doctoral thesis: Diagnosis, assessment and optimisation of the design and operation of municipal MBRs.

Supervisors: Dr Joaquim Comas and Dr Ignasi Rodríguez-Roda.



Patricia González Cárcamo

patricia.gonzalez@lequia.udg.cat

Doctoral thesis: Evaluation of N-oxides emissions from combined PN-Anammox processes treating landfill leachate.

Supervisors: Dr Marilós Balaguer and Dr Jesús Colprim.



Antonia Hadjimichael

antonia.hadjimichael@lequia.udg.cat

Doctoral thesis: Environmental Decision Support Systems (EDSS) for the assessment of environmental and socio-economic impacts of Urban Wastewater Systems.

Supervisor: Dr Joaquim Comas, Dr Manel Poch and Dr Lluís Corominas (ICRA).



Julian Mamo

julian.mamo@lequia.udg.cat

Research topic: Energy optimization in membrane integrated systems for water reuse.

Supervisor: Dr Joaquim Comas.



Daniele Molognoni

daniele.molognoni@lequia.udg.cat

Visiting scientist, Università di Pavia, Department of Civil Engineering and Architecture University of Pavia (Italy)

Doctoral thesis: Application of Microbial Fuel Cells to wastewater

Director: Prof. Andrea Capodaglio

LEQUIA Supervisor: Dr Sebastià Puig



Serni Morera Carbonell
sadurni@lequia.udg.cat

Doctoral thesis: Life Cycle Assessment applied in urban water cycle: modular application in the urban wastewater system.

Supervisor: Dr Joaquim Comas and Dr Lluís Corominas (ICRA)



Narcís Pous Rodríguez
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Doctoral thesis: Bioelectrochemical systems applied to groundwater bioremediation.

Supervisor: Dr Jesús Colprim and Dr Sebastià Puig



Sara Ramió Pujol
sara.ramio@lequia.udg.cat

Doctoral thesis: Biobutanol as a biofuel: Optimization of the biofuel production process from syngas using microorganisms.

Supervisor: Dr Jesús Colprim and Dr. LL. Bañeras (GEMM, UdG)



Patricia Sánchez Paredes
patricia.sanchez@lequia.udg.cat

Doctoral thesis: Biological production of butanol from syngas.

Supervisor: Dr Ramon Ganigué and Dr Jesús Colprim



Elena Tarragó Abella
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Doctoral thesis: Assessment of the operational conditions for nutrient recovery from wastewater.

Supervisor: Dr Jesús Colprim



Esther Vega Martínez
esther@lequia.udg.cat

Doctoral thesis: Minimization and abatement of volatile sulphur compounds on sewage sludge processing.

Supervisors: Dr Maria Martín and Dr Rafael González



Albert Vilà Rovira
albert.vila@lequia.udg.cat

Doctoral thesis: Computational fluid dynamics applied to different bioreactors (anammox and MFC).

Supervisors: Dr Marilós Balaguer and Dr Jesús Colprim



Anna Vilajeliu Pons
avilajeliu@lequia.udg.cat

Doctoral thesis: Evaluation of different MFC designs for wastewater treatment with low Carbon/Nitrogen ratio

Supervisors: Dr Sebastià Puig and Dr Jesús Colprim



Tiago Rogerio Vitor Akaboci
tiago.vitor@lequia.udg.cat

Doctoral thesis: High strength nitrogen wastewater treatment in one-step partial nitrification / anammox process: process automation and minimization of chemical and energy inputs.

Supervisor: Dr Jesús Colprim



> Technical support staff

January 2014



Dr Teresa Bosch Vilardell

teresa.bosch@lequia.udg.cat

Business Development Manager.
Quality Responsible.



Alexandra Popartan

alexandra@lequia.udg.cat

Management of EU projects.
Project manager of SANITAS,
Marie Curie Initial Training
Network.



Dr Alba Anfruns Bagaria

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Laboratory Responsible.



Gemma Rustullet Prat

gemma@lequia.udg.cat

Laboratory Technician.



> Doctoral theses

2011-2013



Multi-scale investigation of occurrence, fate, removal and biodegradation of pharmaceutical contaminants in wastewater treatment and river systems (July 2013)

Author: Neus Collado Alsina; **Directors:** Joaquim Comas and Gianluigi Buttiglieri (ICRA); European Doctoral thesis; **Qualification:** Excel-lent cum laude

<http://www.tdx.cat/handle/10803/123746>



Coordinated management of Urban Wastewater Systems by means of Advanced Environmental Decision Support Systems (May 2013)

Author: Damià Murlà Tuyls; **Directors:** Manel Poch and Oriol Gutiérrez (ICRA); **Qualification:** Excel-lent cum laude

<http://www.tdx.cat/handle/10803/116813>



Development of an Environmental Decision Support System for the selection and integrated assessment of process flow diagrams in wastewater treatment plants (March 2013)

Author: Manel Garrido Baserba; **Directors:** Manel Poch and Luis Larrea (CEIT); European Doctoral Thesis; **Qualification:** Excel-lent cum laude

<http://www.tdx.cat/handle/10803/108953>



Avaluació del paradigma d'agents d'un sistema complex d'aigües residuals (December 2012)

Author: Marta Verdaguer Planas; **Directors:** Manel Poch and Narcís Clara (EDMA-UdG); **Qualification:** Excel-lent cum laude

<http://www.tdx.cat/handle/10803/97128>



Adsorbentes Preparados a partir de residuos y su aplicación en la eliminación de compuestos causantes de olores (NH₃ y H₂S) (November 2012)

Author: Carla Canals Batlle; **Directors:** Maria Martín and Miguel Ángel Montes (CSIC); European Doctoral Thesis; **Qualification:** Excel-lent cum laude

<http://www.tdx.cat/handle/10803/101206>



Integrated management of urban wastewater System: a model-based approach (March 2012)

Author: Pau Prat Busquets; **Directors:** Joaquim Comas and Lluís Corominas (ICRA); European Doctoral Thesis; **Qualification:** Excel-lent cum laude

<http://www.tdx.cat/handle/10803/80837>



Treatment of mature urban landfill leachates by anammox process (February 2012)

Author: Maël Ruscaleda Beylier; **Directors:** Jesús Colprim and Maria Dolors Balaguer; European Doctoral Thesis; **Qualification:** Excel·lent cum laude

<http://www.tdx.cat/handle/10803/78031>



Development of a Decision Support System for the integrated control of membrane bioreactors (November 2011)

Author: Hector Monclús; **Directors:** Ignasi Rodríguez-Roda and Joaquim Comas; European Doctoral Thesis; **Qualification:** Excel·lent cum laude; Extraordinary award from the University of Girona

<http://www.tdx.cat/handle/10803/78922>



Procesos secuenciales de adsorción/oxidación con H₂O₂ para la eliminación de compuestos orgánicos volátiles (November 2011)

Author: Alba Anfruns Bagaria; **Directors:** Maria José Martín and Miguel Ángel Montes (CSIC); European Doctoral Thesis; **Qualification:** Excel·lent cum laude

<http://www.tdx.cat/handle/10803/52866>



Development of an air-scout control System for membrane bioreactors (July 2011)

Author: Giuliana Ferrero; **Directors:** Ignasi Rodríguez-Roda and Joaquim Comas; European Doctoral Thesis; **Qualification:** Excel·lent cum laude

<http://www.tdx.cat/handle/10803/32202>



Biological nutrient removal in SBR technology: from floccular to granular sludge (May 2011)

Author: Marta Coma Bech; **Directors:** Jesús Colprim and Sebastià Puig; European Doctoral Thesis; **Qualification:** Excel·lent cum laude

<http://www.tdx.cat/handle/10803/32025>



PUBLICATIONS

2011-2013

Papers indexed in the Journal Citation Reports (JCR)

- > Collado, N., Buttiglieri, G., Kovelnbach, B.A., Comas, J., Corvini, P.F.-X., Rodríguez-Roda, I. **Exploring the potential of applying proteomics for tracking bisphenol A and nonylphenol degradation in activated sludge.** *Chemosphere*, 90(8), 2309-2314 (2013). IF(2012): 3,173.
- > Collado, N., Buttiglieri, G., Martí, E., Fernando-Climent, L., Rodriguez-Mozaz, S., Barcelón, D., Comas, J., Rodriguez-Roda, I. **Effects on activated sludge bacterial community exposed to sulfamethoxazole.** *Chemosphere*, 93(1), 99-106 (2013), IF(2012): 3,173.
- > Garcia, N., Moreno, J., Cartmell, E., Rodriguez-Roda, I., Judd, S. **The application of microfiltration-reverse osmosis/nanofiltration to trace organics removal for municipal wastewater reuse.** *Environmental Technology (United Kingdom)*, 34(24), 3183-3189 (2013), IF(2012): 1,606.
- > J. Gabarró, E. Hernández-del Amo, F. Gich, M. Ruscalleda, M.D. Balaguer, J. Colprim . **Nitrous oxide reduction genetic potential from the microbial community of an intermittently aerated partial nitrification SBR treating mature landfill leachate.** *Water Research*, 47(19) 7066-7077 (2013). IF(2012): 4,655.
- > E. Llorens, J. Obradors, M.T. Alarcón-Herrera, M. Poch, **Modelling of arsenic retention in constructed wetlands,** *Bioresource Technology*, 147, 221-227 (2013). IF(2012): 4,750.
- > A. Montserrat, O. Gutiérrez, M. Poch, L. Corominas, **Field validation of a new low-cost method for determining occurrence and duration of combined sewer overflows,** *Science of the Total Environment*, 463-464, 904-912 (2013). IF(2012): 3,258.
- > B.-J. Ni, M. Ruscalleda, C. Pellicer-Nàcher, B. F. Smets, **Reply to Comment on "Modeling Nitrous Oxide Production during Biological Nitrogen Removal via Nitrification and Denitrification: Extensions to the General ASM Models",** *Environmental Science & Technology*, 47 (20), 11910-11911 (2013). IF(2012): 5,257.
- > B. Lanham, A. R. Ricardo, M. G.E. Albuquerque, F. Pardelha, M. Carvalheira, M. Comab, Joana Fradinho, G. Carvalho, A. Oehmena, M. A.M. Reisa, **Determination of the extraction kinetics for the quantification of polyhydroxyalkanoate monomers in mixed microbial systems,** *Process Biochemistry*, 48(11), 1626-1634 (2013). IF(2012): 2,414.
- > M. Canals, R. Gonzalez-Olmos, M. Costas, A. Company, **Robust Iron Coordination Complexes with N-Based Neutral Ligands As Efficient Fenton-Like Catalysts at Neutral pH,** *Environmental Science & Technology*, 47(17), 9918-9927 (2013). IF(2012): 5,257.
- > M. Coma i S. Puig, **Bioelectrochemical treatment of contaminated groundwater,** *Journal of Bioremediation & Biodegradation*, 4:e135 (2013).
- > Ll. Corominas, J. Foley, J. S. Guest, A. Hospido, H.F. Larsen, S. Morera, A. Shaw, **Life Cycle Assessment Applied to Wastewater Treatment: state of the art,** *Water research*, 68 (1), 1-15 (2013). IF(2012): 4,655.
- > U. Jeppsson, J. Alex, D. J. Batstone, L. Benedetti, J. Comas, J. B. Copp, L. Corominas, X., Flores-Alsina, K. V. Gernaey, I. Nopens, M.-N. Pons, I. Rodríguez-Roda, C. Rosen, J.-P., Steyer, P. A. Vanrolleghem, E. I. P. Volcke and D. Vrecco, **Benchmark simulation models, quo vadis?,** *Water Science & Technology*, 68 (1) 1-15 (2012). IF(2012): 1,102.
- > M. Molinos-Senante, R. Reif, M. Garrido-Baserba, F. Hernández-Sancho, F. Omil, M. Poch, R. Sala-Garrido, **Economic valuation of environmental benefits of removing pharmaceutical and personal care products from WWTP effluents by ozonation,** *Science of the Total Environment*, 461-462 (1) (2013), IF(2012): 3,258.
- > E. Vega, J. Lemus, A. Anfruns, R. Gonzalez-Olmos, J. Palomar, M. J. Martín, **Adsorption of volatile sulphur compounds onto modified activated carbon: effect of oxygen functional groups,** *Journal of Hazardous Materials*, 258-259, 77-83 (2013), IF(2012): 3,925.
- > Anfruns, J. Gabarró, R. Gonzalez-Olmos, S. Puig, M.D. Balaguer and J. Colprim, **Coupling anammox and advanced oxidation-based technologies for mature landfill leachate treatment,** *Journal of Hazardous Materials*, 258-259, 27-34 (2013), IF(2012): 3,925.
- > R. González-Olmos, F.-D. Kopinke, K. Mackenzie, A. Georgi, **Hydrophobic Fe-Zeolites for removal of MTBE from water by combination of adsorption and oxidation,** *Environmental Science and Technology*, 47(5), 2353-2360 (2013). IF(2012): 5,257
- > L. Corominas, V. Acuña, A. Ginebreda, M. Poch, **Integration of freshwater environmental policies and wastewater treatment plant management,** *Science of the Total Environment*, 445-446, 185-191 (2013). IF(2012): 3,258.
- > M. Dalmau, I. Rodríguez-Roda, E. Ayesa, J. Odriozola, L. Sancho and J. Comas, **Development of a decision tree for the integrated operation of nutrient removal MBRs based on simulation studies and expert knowledge,** *Chemical Engineering Journal*, 127(1), 174-184 (2013). IF(2012): 3,473.
- > M. Coma, S. Puig, N. Pous, M.D. Balaguer, J. Colprim, **Biocatalysed sulphate removal in a BES cathode,** *Bioresource Technology*, 130, 218-223 (2013). IF(2012): 4,750.
- > J. Moreno, H. Monclús, M. Stefani, E. Cortada, J. Aumatell, N. Adroer, S. de Lamo-Castellví, J. Comas. **Characterisation of RO fouling in an integrated MBR/RO System for wastewater,** *Water Science and Technology*, 67(4), 780-788 (2013) IF(2012): 1,102.

- > S. Gabarron; M. Gómez; H. Monclus; I. Rodríguez-Roda; Joaquim Comas. **Ragging phenomenon characterisation and impact in a full-scale MBR.** *Water Science and Technology*, 67(4), 810-816 (2013) IF(2012): 1.102.
- > N. Pous, S. Puig, M. Coma, M.D. Balaguer, J. Colprim, **Bioremediation of nitrate-polluted groundwater in a microbial fuel cell,** *Journal of Chemical Technology and Biotechnology*, 88(9), 1690-1696 (2013) IF(2012): 2.504.
- > Anfruns, R. González-Olmos, M.A. Montes-Morán, M.J. Martín, **H₂O₂-based oxidation processes for the regeneration of activated carbons saturated with volatile organic compounds of different polarity,** *Chemosphere*, 91(1), 48-54 (2013), IF(2012): 3.137.
- > García, N., Moreno, J., Cartmell, E., Rodríguez-Roda, I., Judd, S., **The cost and performance of an MF-RO/NF plant for trace metal removal,** *Desalination*, 309, 181-186 (2013), IF(2012): 2.751.
- > J. Colomer, A. Wong, M. Coma, S. Puig, J. Colprim, **Quantitative estimation of SBR biological nutrient removal performance for wastewater treatment,** *Journal of Chemical Technology and Biotechnology*; 88(7), 1305-1313 (2013). IF(2012): 2.504.
- > Vilar-Sanz, A., S. Puig, S., A. García-Lledó, R. Trias, R., M.D. Balaguer, J. Colprim, L. Bañeras, **Denitrifying bacterial communities affect current production and nitrous oxide accumulation in a microbial fuel cell,** *PLoS ONE* 8(5), art. N^o e63460 (2013)
- > M. Coma, S. Rovira, J. Canals, **Minimization of sludge production by a side-stream reactor under anoxic conditions in a pilot plant,** *Bioresource Technology*, 129, 229-235 (2013). IF(2012): 4.750.
- > J. Colomer, A. Wong, M. Coma, S. Puig, J. Colprim, **Qualitative estimation of SBR Biological Nutrient Removal Performance for Wastewater Treatment,** *Journal of Chemical Technology & Biotechnology*, 88(7), 1305-1313 (2013)
- > J. Gabarró, L. Batchellí, M.D. Balaguer, S. Puig, J. Colprim, **Grey water treatment at a sports centre for reuse in irrigation,** *Environmental Technology*, 34(11), 1385-1392 (2013). IF(2012): 1,606.
- > G. Ferrero, H. Monclús, L. Sancho, J.M. Garrido, J.Comas, I. Rodríguez-Roda, **A knowledge-based control system for air-scour optimisation in membrane bioreactors,** *Water Science and Technology*, 63(9), 2025-2031 (2013). IF(2012): 1,102.
- > M. Garrido-Baserba, R. Reif, F. Hernández, M. Poch, **Implementation of a knowledge-based methodology in a decision support system for the design of suitable wastewater treatment process flow diagrams,** *Journal of Environmental Management*, 112(15), 384-391 (2012). IF(2012): 3.057.
- > L. Fernando-Climent, N. Collado, G. Buttiglieri, M. Gros, I. Rodríguez-Roda, S. Rodríguez-Moraz, D. Barceló, **Comprehensive study of ibuprofen and its metabolites in activated sludge batch experiments and aquatic environment,** *Science of the Total Environment*, 438, 404-413 (2012), IF(2012): 3,258.
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BOOK CHAPTERS

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- > Prof. Detlef Stolten, Dr. Bernd Emonts, Jan B. A. Arends, Joachim Desloover, Sebastià Puig, Willy Verstraete, **Principles and Technology of Microbial Fuel Cells Referència: Fuel Cell Science and Engineering: Materials, Processes, Systems and Technologies**, DOI: 10.1002/9783527650248.ch6, Germany (2012)
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BOOKS

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Journal	2011	2012	2013	Number	IF (2012)
Applied Catalysis B: Environmental		1		1	5,825
Environmental Science and Technology	2	2	3	7	5,257
Bioresource Technology	4	5	3	12	4,75
Water Research		2	2	4	4,655
Current Medicinal Chemistry		1		1	4,07
Journal of Hazardous Materials	1	1	2	4	3,925
Environmental Modelling and Software	1			1	3,476
Chemical Engineering Journal	1	2	1	4	3,473
Critical Reviews in Environmental Science and Technology				0	3,383
Science of the Total Environment		3	3	6	3,258
Chemosphere			3	3	3,173
Journal of Environmental Management		1		1	3,057
Ecological Engineering				0	2,958
Desalination	2		1	3	2,751
Journal of the Chemical Technology and Biotechnology	1		2	3	2,504
AIChE Journal		1		1	2,493
Process biochemistry				0	2,414
Ecological Modelling				0	2,069
Comptes Rendus Chimie			1	1	1,92
Bioprocess and Biosystems Engineering	1			1	1,869
Environmental Technology			2	2	1,606
Water Environment Research				0	1,134
Environmental Engineering and Management Journal				0	1,117
Water Science and Technology	3	2	2	7	1,102
Total	16	21	25	62	

Number of papers per year in journals indexed by JCR (2009-2013)



CONFERENCES

2011-2013

Participation in scientific conferences

- > Final seminar of Novedar_Consolider project, Royal Botanical Garden, Madrid (Spain), 14th November 2013
- > Workshop on technological innovation through LIFE projects, Rimini (Italy), 7th November 2013
- > 3rd European Conference on Environmental Application of AOPs (EAAOP3), Almería (Spain), 27-30th October 2013
- > XII Reunión del Grupo Español del Carbón (XII GEC), Madrid (Spain), 20-23th October 2013
- > 11th IWA Conference on Instrumentation, Control and Automation (ICA), Narbonne (France), 18-20th September 2013
- > 3th International Conference of Nitrification (ICoN3), Tokyo (Japan), 2-5th September 2013
- > 4th International Microbial Fuel Cell Conference (MFC4), Cairns (Queensland, Australia), 1-4th September 2013
- > IWA-MTC Membrane Technology Conference 2013, Toronto (Canada), 26-29th August 2013
- > WEF/IWA International Conference and Exhibition on Nutrient Removal and Recovery, Vancouver (Canada), 28-31st July 2013
- > International Conference on Chemistry and the Environment (ICCE), Barcelona (Spain), 25-28th June 2013
- > 9th International Conference on Renewable Resources and Biorefineries, Antwerp (Belgium), 5-7th June 2013
- > International Workshop on "Advanced and Environment-Friendly Wastewater Treatment Technologies", Hanoi (Vietnam), 26-27th February 2013
- > Atwat project workshop "Advanced tools for wastewater treatment", Tiaruchirapalli (India), 28-29th January 2013
- > 18th SETAC LCA Case Study Symposium, Copenhagen (Denmark), 26-28th November 2012
- > Reunión de la Mesa Española de Tratamiento de Aguas META, Almería (Spain), 4-5th October 2012
- > European International Society for Microbial Electrochemical Technologies Meeting, Ghent (Belgium), 27-28th September 2012
- > Euromembrane 2012, London (UK), 23-24th September 2012
- > 14th International Symposium on Microbial Ecology: ISME14, Copenhagen (Denmark), 19-24th August 2012
- > 6th IWA Conference for Young Water Professionals, Budapest (Hungary), 10-13th July 2012
- > International Congress on Environmental Modelling and Software IEMS 2012, Leipzig (Germany), 1-5th July 2012
- > First joint workshop on data mining and intelligent decision support systems for environmental scientist (2012) oral, International Congress on Environmental Modelling and Software IEMS 2012, Leipzig (Germany), 1-5th July 2012
- > SIDISA 2012, Milano (Italy), 26-29th June 2012
- > ECO-STP "EcoTechnologies for Wastewater Treatment", Santiago de Compostela (Spain), 26-28th June 2012
- > Carbon 2012, Cracow (Poland), 17-22nd June 2012
- > 6th IWA conference on Oxidation Technologies for Water and Wastewater Treatment, Goslar (Germany), 7-9th May 2012
- > 5th European Water and Wastewater Management Conference & Exhibition, Marseille (France), 12-17th March 2012
- > Ecotech & tools: Environmental & Integrated assessment of Complex Systems Conference, Montpellier (France), 30th November – 2nd December 2011
- > Watermatex 2011: 8th IWA Symposium on Systems Analysis and Integrated Assessment San Sebastián (Spain), 20-22nd June 2011
- > 2nd IWA Spain National Young Water Professionals Conference, Madrid (Spain), June 2011
- > 1st International Plant Power Symposium, Gent (Belgium), 10th February 2011
- > IWA/WEF Nutrient Recovery and Management 2011, Miami, Florida (USA), 9-12th January 2011

ORGANISATIONS of INTERNATIONAL CONFERENCES

- > 8th Symposium on System Analysis and Integrated Assessment (WATERMATEX 2011), Sant Sebastián (Spain), 20-22nd June 2011. Conference organized in conjunction with CEIT and ICRA.



PROJECTS

> European / internacional projects



www.sanitas-itn.eu

SANITAS - Sustainable and Integrated Urban Water System Management

Program: VII FP Marie Curie ITN (EC); **Duration:** November 2011 – October 2015; **IP:** Dr Joaquim Comas; **LEQUIA role:** coordinator; **Reference:** GA 289193.

SANITAS was created to address human resource deficiencies in European Urban Water System (UWS) management, and the need for technology applications and for sustainability through integrated technology, knowledge and action.



ManureEcoMine – Green Fertilizer upcycling from manure: Technological, economical and environmental sustainability demonstration

Program: VII FP ENV.2013.6.3-2; **Duration:** November 2013 – October 2016; **IP:** Dr Jesús Colprim; **LEQUIA role:** partner; **Coordinator:** LabMET – University of Ghent (Belgium); **Reference:** GA 603744.

ManureEcoMine proposes an integrated approach to the treatment and reuse of animal husbandry waste in nitrate-vulnerable and sensitive areas and beyond, by applying the eco-innovative principles of sustainability, resource recovery and energy efficiency.



www.showwproject.eu

SHOWW – Pushing ahead with field implementation of best fitting wastewater and management solutions

Program: LIFE+ Environment; **Duration:** November 2011 – August 2014; **IP:** Dr Joaquim Comas; **LEQUIA role:** partner; **Coordinator:** DICEA - Università di Firenze (Italy); **Reference:** LIFE10/INF/IT/282

SHOWW solves environmental impact problems caused by the inadequate management of wastewater and wastewater treatment plants and requiring improved capacity, effectiveness and efficiency of wastewater treatment and management. SHOWW selects and promotes technical and managerial solutions investigated in previous LIFE projects.



www.ecotechsudoe.eu

Ecotech-Sudoe – International network on life cycle assessment and ecodesign for the environmental innovation of technology

Program: IV SUDOE; **Duration:** November 2011 – September 2013; **IP:** Dr Joaquim Comas; **LEQUIA role:** partner; **Coordinator:** Universitat Autònoma de Barcelona; **Reference:** SOE2/P1/E377.

ECOTECH-SUDOE merges sustainability and competitiveness. Ecotechnologies, based on emerging areas of research, such as social and environmental LCA, ecodesign or industrial and territorial ecology, are powerful tools to achieve this, providing the same level of service with lower environmental and social impacts.

SYNTOBU

SYNTOBU – Biological production of butanol from syngas

Program: VII FP-PEOPLE-2013-CIG; **Duration:** September 2013-August 2017; **LEQUIA role:** sole beneficiary; **IP:** Dr Ramon Ganigué (supervisor: Dr. Jesús Colprim); **Reference:** GA 618593.

SYNTOBU investigates the production of butanol from syngas, characterizing the process both kinetically and stoichiometrically, identifying optimal operational conditions and investigating the production of butanol in continuous mode under different bio-reactor configurations.



www.newindigo-atwat.com

AtWat – Advanced tools for water treatment

Program: Acciones de Cooperación Internacional (MEC); **Duration:** January 2013- December 2015; **IP:** Dr Joaquim Comas; **LEQUIA role:** partner; **Reference:** PCIN-2013-074.

Atwat harnesses complementary expertise from partner institutes to establish a multi-lateral Indo-European research network to make significant contributions in the wastewater treatment field.



www.water2020.eu

Action COST Water 2020: Conceiving wastewater treatment in 2020. Energetic, environmental and economic challenges.

Program: Action COST; **Duration:** 2013-2014; **Reference:** Action COST ES 1202.

COST Action Water_2020 brings together leading professionals working on complementary areas of wastewater treatment (WWT) at research institutions, industries and water agencies.



www.demeaumed.eu

demEAUmed – Demonstrating integrated innovative technologies for an optimal and safe closed water cycle in Mediterranean tourist facilities.

Duration: November 2013 – October 2016. **Program:** VII FP – ENV-2013-WATER-INNO-DEMO; **IP:** Dr Ignasi Rodriguez-Roda; **Coordinator:** LEITAT; **Reference:** GA 619116; Project in collaboration (ICRA-UdG alliance).

DemEAUmed involves industry representatives, stakeholders, policy makers and diverse technical and scientific experts in demonstrating and promoting innovative technologies for an optimal and safe closed water cycle in Euro-Mediterranean tourist facilities, leading to their eventual market uptake.



www.r3water.eu

R3-Water – Demonstration of innovative water solutions for reuse of water, recovery of valuable substances and resource efficiency in urban wastewater treatment.

Duration: November 2013 – October 2016. **Program:** VII FP – ENV-2013-WATER-INNO-DEMO; **IP:** Dr Ignasi Rodriguez-Roda; **Coordinator:** LEITAT; **Reference:** GA 619093; Project in collaboration (ICRA-UdG alliance).

R3-Water demonstrates solutions to support the transition from a treatment plant for urban wastewater to a production unit of different valuables.

ARSENIC

<http://arsenico.cimav.edu.mx>

Arsenic problems and removal from water for domestic uses in Latin American communities.

Duration: 2010-2012. **IP:** Dr Manel Poch; **Program:** AECID, 2ª convocatoria CAP 2011; **LEQUIA role:** third party; **Reference:** (AECID)-(10-CAP1-0631).

ARSENIC transfers knowledge of a low-cost technology based on constructed wetlands for arsenic removal. The technology will be implemented in drinking water in rural areas in Chihuahua, Mexico and other similar regions.

> National projects with business participation

N-OPTIMOX

N-OPTIMOX – Primera planta de demostración de la tecnología PANAMMOX aplicada al tratamiento de lixiviados

Program: INNPACTO; **Duration:** January 2011 – December 2014; **IP:** Dr Jesús Colprim; **Coordinator:** CESPA GR; **Reference:** IPT-2011-1073-31000.

N-OPTIMOX is a project (backed by a consortium of LEQUIA and the industrial company CESPA) that demonstrates the feasibility of the PANAMMOX® process at semi-industrial scale. PANAMMOX® is an advanced process to remove nitrogen from landfill leachates.



TecoAgua – Tecnologías sostenibles para el ciclo integral del agua

Program: CENIT (CDTI); **Duration:** December 2008 – December 2014; **IP:** Dr Jesús Colprim; **LEQUIA role:** subcontractor; **Coordinator:** Befesa Agua

TecoAgua develops sustainable technologies for the generation of alternative hydric resources. LEQUIA researchers were subcontracted to carry out two research studies on bioelectrochemical systems (BES).

<http://cenit-tecoagua.com>



ITACA – Investigación de tecnologías de tratamiento, reutilización y control para la sostenibilidad futura de la depuración de aguas

Program: INNPRONTA (CDTI); **Duration:** October 2011 – December 2014; **IP:** Dr Jesús Colprim / Dr Ignasi Rodríguez-Roda; **LEQUIA role:** subcontractor; **Coordinator:** ADASA Sistemas; **Reference:** IPT-2011-1073-31000.

ITACA focuses its research on new urban and industrial wastewater treatment technologies based on the reuse, valorisation and recovery of water, nutrients and energy to reduce environmental impacts. LEQUIA researchers were subcontracted to carry out two research studies.

<http://itaca.adasasistemas.com>

> National projects without business participation



NOVEDAR_Consolider

NOVEDAR_Consolider – Conception of the Sewage Treatment Plant of the XXI Century. Development, implementation and evaluation of technologies for the treatment and resources recovery from wastewaters

Program: Consolider Ingenio; **Duration:** October 2007 – November 2012; **IP:** Dr Manel Poch; **LEQUIA role:** partner; **Coordinator:** Universidad de Santiago de Compostela; **Reference:** CSD2007-005.

Novedar_Consolider faces three main challenges: improving water and product recovery during wastewater treatment, minimising energy requirements and operational costs of full-scale plants, and minimising sludge production. The consortium is formed by 11 research groups from Spain and the Netherlands.

<http://www.novedar.com>

SIRENA

SIRENA – Removal of siloxanes in the energy recovery of WWTP biogas: Advanced oxidation processes

Program: MEC – Programa de investigación fundamental no orientada; **Duration:** January 2011 – December 2014; **IP:** Dr Maria Martín; **LEQUIA role:** sole beneficiary; **Reference:** CTQ2011-24114.

SIRENA seeks to develop a sequential adsorption/oxidation process for biogas siloxane removal by means of activated carbons or different types of zeolites and H₂O₂/O₂. This combined process minimises costs, improves removal capacity and favours in situ regeneration of adsorbent materials.

BEST-ENERGY

Sistemas electroquímicos para el tratamiento de aguas y de transferencia electrónica a la aplicación biotecnológica

Program: MEC – Programa de investigación fundamental no orientada; **Duration:** January 2011 – December 2014; **IP:** Dr Jesús Colprim; **LEQUIA role:** sole beneficiary; **Reference:** CTQ2011-23632.

BEST-ENERGY deals with the application of bioelectrochemical systems (BES) for water (wastewater and groundwater) treatment.

<http://best-energy.blogspot.com>

COLMATAR+

Colmatar+ - Nuevos desarrollos, implementación y validación a diferentes escalas de un SAD para el control y la operación de MBR. De la investigación básica a la operación óptima

Program: MEC – Programa de investigación fundamental no orientada; **Duration:** January 2010 – December 2012; **IP:** Dr Joaquim Comas; **LEQUIA role:** sole beneficiary; **Reference:** CTM2009-14742-CO2-01.

COLMATAR+ investigates new knowledge and techniques related to membrane bioreactors (MBR), as well as their practical application at different scales, to optimise and validate decision support systems for integrated control and operation.

<http://www.colmatar.es>



Desenvolupament i validació a escala real del sistema automàtic de control i d'aïreació en reactors biològics de membranes (MBR)

Program: VALOR (AGAUR); **Duration:** January 2011– December 2012; **IP:** Dr Joaquim Comas; **LEQUIA role:** sole beneficiary; **Reference:** 2010 Valor 00170.

Smart Air MBR validated a decision support system for the automatic control of membrane bioreactors at real scale. The system had been previously developed by LEQUIA and GS INIMA researchers and technicians, and patented and registered under the trademark Smart Air MBR®.

ENDERUS

ENDERUS – Environmental Decision Support Systems to select robust operational strategies in urban water systems.

Duration: 2010-2012; **IP:** Dr Manel Poch; **Program:** MINECO, Proyectos de investigación fundamental no orientada; **LEQUIA role:** sole beneficiary; **Reference:** CTM2012-38314-CO2-01.

ENDERUS is developing an environmental decision support system (EDSS) to solve problems related to the integrated management of sewer systems (collectors, wastewater treatment plants, storage tanks and reception media).

WaterFate

WaterFate - The fate of micropollutants and disinfection by-products in integrated membrane systems followed by disinfection The potential of indirect and direct potable reuse.

Duration: 2013-2015; **Program:** MINECO, Proyectos de investigación fundamental no orientada; **IP:** Dr Ignasi Rodriguez-Roda; **Reference:** CTM2012-38314-CO201. Project in collaboration (ICRA-UdG alliance)

WaterFate delves deeper into research on basic aspects of the removal of priority and emerging micropollutants and disinfection by-products in all steps of water recycle systems that transform municipal wastewater into high quality reclaimed water. The case study selected involves an MBR filter coupled to an NF/RO filter followed by disinfection (chemical, physical and physicochemical).



TECHNOLOGY TRANSFER

PANAMMOX® process: pilot plant 

Technology transfer to private and public organisations has always been a priority in our group. In addition to the high number of R&D projects with business participation and technology transfer contracts, LEQUIA researchers have obtained patents and, in 2003, founded the spinoff company Sanejament Intel·ligent S.L. (SISLtech S.L.).

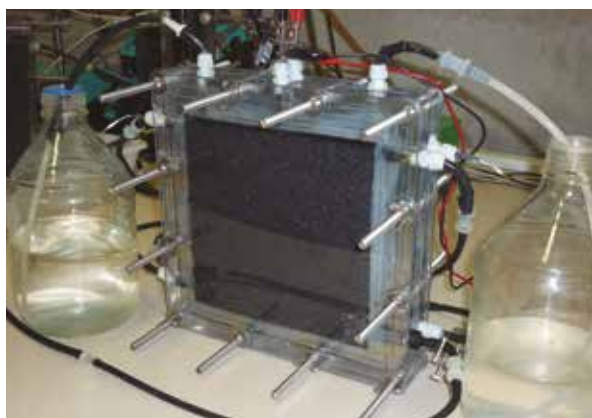
Expertise

Biological nutrient removal and recovery from wastewaters

- > Urban wastewater treatment through carbon, nitrogen and phosphorous removal.
- > Treatment of side streams with advanced technologies: anammox, partial nitrification, phosphorus recovery, etc.
- > Panammox® process: nitrification plus anammox process for the treatment of landfill leachates with high ammonia nitrogen content.
- > Biminex®: reduction of the excess sludge in extended aeration WWTPs by uncoupling catabolic and anabolic metabolism.
- > Biological fermentation of Syngas from excess sludge to obtain biofuels (i.e. ethanol and butanol).

Bioelectrochemical systems (BES)

- > Studies on the bioremediation of groundwater polluted with inorganic nitrogen and sulphur compounds.
- > Studies on the removal of GHG (nitrous oxide; N₂O) in biocathode MFCs.
- > Studies on organic matter and nitrogen removal from urban and industrial (leachate, pig slurry and meat industry effluent) wastewaters.
- > Knowledge about the operational parameters to maximise power generation and treatment capacity.
- > Knowledge about BES design and scalability.
- > Identification of microbial population through molecular techniques (FISH, SEM, PCRs).



Microbial Fuel Cells 

Advanced adsorption and oxidation processes

- > Advanced oxidation processes for wastewater treatment with H_2O_2 and/or O_2
- > Testing and characterisation of adsorbent materials.
- > Analysis of contaminant gases (siloxanes, odorous sulfur compounds, VOC).

Membrane bioreactors (MBR)

- > Studies on membrane fouling and clogging: from basic research of the responsible parameters to practical aspects for cleaning and monitoring.
- > Study of the integration of MBR and RO for advanced water treatment and reuse.
- > Modelling and simulation of membrane bioreactors at different scales.
- > Monitoring and automatic control of MBRs to optimise biological nutrient removal, while minimising fouling and saving energy.
- > Study of the removal mechanisms and efficiencies of pharmaceuticals in wastewater.
- > Development and validation of decision support systems for the integrated and knowledge-based supervision of MBRs.

Environmental decision support systems (EDSS)

- > Knowledge management and the development and implementation of multi-criteria environmental decision support systems (EDSS) in water-related systems.
- > Integration of artificial intelligence (AI) techniques with conventional modelling techniques and control algorithms in EDSS to manage complex environmental systems, especially water and wastewater processes (e.g. membrane bioreactors) and fluvial ecosystems.
- > Planning, designing, operating and maintaining small and decentralised systems, including natural ones, or medium and large wastewater treatment systems.
- > Multi-criteria (technical and socio-economical) and life cycle analysis of UWS.
- > Integrated control of the urban water cycle (sewer system, wastewater treatment plant and receiving media) to improve the ecological status of water bodies.
- > Knowledge-based modelling of microbiology-related operational problems in urban wastewater systems.



Membrane bioreactor: pilot plant

Patents

LEQUIA researchers are owners of two patents (one approved in 2010 and the other one submitted in 2012):

- > *Procedimiento automatizado de control en tiempo real de un bioreactor de membranas y un sistema de control correspondiente*. Publication date: October 2010. Applicants: University of Girona / OHL Medio Ambiente INIMA S.A.U.; Inventors: Rodríguez-Roda, I.; Poch, M.; Ferrero, G.; Sipma, J.; Clara, P.; Canals, J.; Rovira, S.; Monclús, H.; ES 2 333 837 B1.
- > *Bioremediation treatment of contaminated water with oxidised nitrogen compounds*. Submission date: October 2012. Applicant: University of Girona; Inventors: J. Colprim, M.D. Balaguer; S. Puig; N. Pous; European Patent EP 1238471.6; PCT/EP2013/074711.

Some of our partners



DISSEMINATION

The dissemination of LEQUIA research activities is part of our mission. Our specific objectives include encouraging primary and high school students to choose degree programmes in the sciences, organising activities in the water science field and promoting LEQUIA research in Catalan society. Every year, LEQUIA takes part in several dissemination activities, individually or as a research group of the University of Girona.



"Fira de la Ciència", Girona, 2012: LEQUIA workshop on wastewater treatment

Types of activities:

- > Open house activities
- > Fairs and exhibitions
- > Internships for secondary school students
- > Non-specialised media (press, TV, radio)
- > Workshops and conferences for non-specialised audiences
- > LEQUIA's own dissemination programmes and initiatives

Our main audience:

- > Primary and secondary school students
- > Secondary school teachers
- > Girona and Catalan society

L'Aigua en xarxa

From October 2012 to June 2013, LEQUIA produced a radio programme called "L'Aigua en xarxa" (La Xarxa Freqüència Girona) aimed at disseminating water issues. Experts from the academic, business, NGO and government sectors were interviewed to discuss different aspects of water management and treatment.

<http://laiguaenxarxa.blogspot.com>



"Researchers' night", Girona, 2013: LEQUIA workshop on water sampling





FACTS AND FIGURES



Pilot plants (Science Park) [↗](#)



	2011	2012	2013
Staff	36	38	38
Staff holding a PhD	11	11	14
PhD dissertations defended	4	4	3
Peer reviewed scientific papers	16	21	25
Participation in scientific conferences as speaker	21	14	27
Patents	-	1	-
Turnover	1.064.481 €	1.560.490 €	1.054.889 €
Competitive funds with business participation	184.688 €	467.091 €	478.210 €
Competitive funds without business participation	682.272 €	541.926 €	498.144 €
R&D and innovation contracts	187.280 €	551.475 €	78.535 €
Training and consultancy services	10.241 €	-	-





CONTACT



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