

SCIENTIFIC PORTFOLIO

BioElectrochemical Systems (BES)

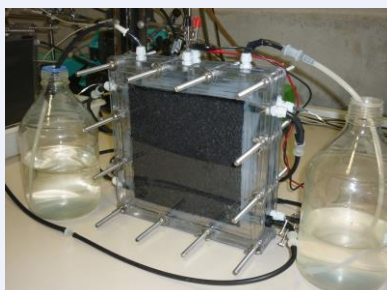
Last updated: December 2018

Name of scientists in charge

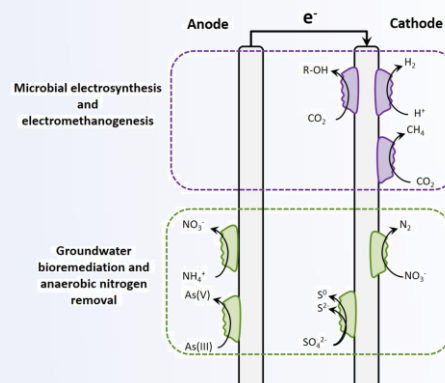
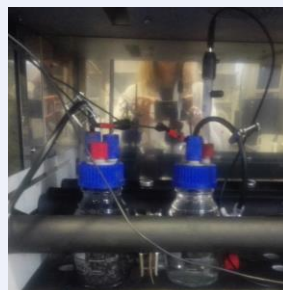
- > **Dr Sebastià Puig**, Senior Lecturer. sebastia@lequia.udg.cat
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Technology description

- > Bioremediation of contaminated groundwater.
- > Microbial electrosynthesis: from CO₂ to valuable products.
- > Biogas upgrading (electromethanogenesis)
- > Anaerobic nitrogen removal from contaminated waters.



Bioelectrochemical systems (BES) at lab scale



Research expertise

- > Studies on bioremediation of groundwater polluted with inorganic nitrogen and sulphur compounds.
- > Studies on organic matter and nitrogen removal of urban and industrial (leachate, pig slurry and meat industry effluent) wastewaters.
- > Studies about CO₂ removal/transformation (biogas purification, carbon capture, bioelectrosynthesis of alcohols and volatile fatty acids)
- > Knowledge about the operational parameters to maximize power generation and treatment capacity.
- > Knowledge about BES design and scalability.
- > Identification of microbial population through molecular techniques (FISH, SEM, PCRs).

Most relevant projects

- > **ELECTRA – Electricity driven Low Energy and Chemical input Technology foR Accelerated bioremediation.** European Commission. H2020-NMBP-CE-BIOTEC-04-2018. Ref. 826244. 2019-2023.
- > **BioReCO₂Ver – Biological routes for CO₂ conversion into chemicals building blocks.** European Commission. H2020-NMBP-BIOTEC-05-2017. GA 760431. 2018-2022. <http://bioreco2ver.eu>
- > **DigesTake – Recovery and valorization of urban digestates on the framework of circular economy.** ACCIÓ – Catalan Government. Comunitat RIS3CAT Aigua. COMRDI16-1-0061. 2017-2021. <http://www.comunitataigua.cat/>

Most relevant publications

- > Vilajeliu-Pons, A., Koch, C., Balaguer, M.D., Colprim, J., Harnisch, F., Puig, S. (2018). **Microbial electricity driven anoxic ammonium removal.** *Water Research*, 130, 168-175.
- > Pepè Sciarra, T., Batlle-Vilanova, P., Colombo, B., Scaglia, B., Balaguer, M.D., Colprim, J., Puig, S., Adani, F. (2018). **Bio-electrorecycling of carbon dioxide into bioplastics.** *Green Chemistry*, 20(17), 4058-4066.
- > Pous, N., Balaguer, M.D., Colprim, J., Puig, S. (2018). **Opportunities for groundwater microbial electroremediation,** *Microbial biotechnology*, 11(11), 18-19.
- > Batlle-Vilanova, P., Ganigué, R., Ramió-Pujol, S., Bañeras, L., Jiménez, G., Hidalgo, M., Balaguer, M.D., Colprim, J., Puig, S. (2017) **Microbial electrosynthesis of butyrate from carbon dioxide: Production and extraction,** *Bioelectrochemistry*, 117, 57-64.
- > Pous, N., Puig, S., Balaguer, M.D., Colprim, J. (2017). **Effect of hydraulic retention time and substrate availability in denitrifying bioelectrochemical systems,** *Environmental Science: Water Research and Technology*, 3(5), pp. 922-929.
- > Puig, S., Ganigué, R., Batlle-Vilanova, P., Balaguer, M.D., Bañeras, L., Colprim, J. (2017) **Tracking biohydrogen-mediated production of commodity chemicals from carbon dioxide and renewable electricity.** *Bioresource Technology*, 228, pp. 201-209.
- > Vilajeliu-Pons, A., Puig, S., Salcedo-Dávila, I., Balaguer, M.D., Colprim, J. (2017). **Long-term assessment of six-stacked scaled-up MFCs treating swine manure with different electrode materials.** *Environmental Science: Water Research and Technology*, 3(5), pp. 947-959.

Patents

- > **Bioremediation treatment of contaminated water with oxidized nitrogen compounds.** Applicant: Universitat de Girona. Inventors: J. Colprim, M.D. Balaguer, S. Puig, N. Pous. European Patent EP 1238471.6; PCT/EP2013/074711.