

## SCIENTIFIC PORTFOLIO

BioElectrochemical Systems (BES) for water remediation

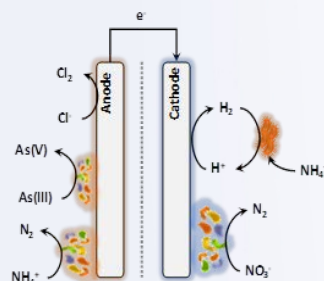
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### Name of scientists in charge

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### Technology description

- > Electro-bioremediation of contaminated waters (urban and industrial wastewater, groundwater).
- > Anaerobic nitrogen removal from contaminated waters (nitrates and ammonium).
- > Anaerobic arsenite oxidation to arsenate as a pre-treatment.
- > Electrochemical softening.
- > Electrochemical production of chlorine.
- > Ammonium accumulation into microbial protein



### Research expertise

- > Studies on bioremediation of groundwater polluted with inorganic nitrogen, arsenic and sulphur compounds.
- > Studies on electrochemical softening and electrochemical production of chlorine.
- > Studies on organic matter and nitrogen removal of urban and industrial (leachate, pig slurry and meat industry effluent) wastewaters.
- > Studies on electricity-driven ammonium removal.
- > Studies on accumulation of ammonium in hydrogen-oxidizing bacteria.
- > Knowledge about the operational parameters to maximize the treatment capacity.
- > Knowledge about BES design and scalability.
- > Identification of microbial population through molecular techniques (FISH, SEM, PCRs).
- > Electrochemical characterization of electroactive biofilms.

## 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. <http://electra.site>
- > **WAFRA – Wireless Aquaponic Farming in Remote Areas: A smart adaptive socio-economic solution.** ERANETMED. ERANETMED3-221. 2018-2021.
- > **RITA – Urban water cycle Resilient To pAndemics.** PANDÈMIES 2020. 2020PANDE00176

## Awards

- > **Prize to Young Talent in Sustainable Water Management 2014** from the Botín Foundation.

## Most relevant publications

- > Ceballos-Escalera A., Pous N., Chiluíza-Ramos P., Korth B., Harnisch F., Bañeras L., Balaguer M.D., Puig S. (2021), **Electro-bioremediation of nitrate and arsenite polluted groundwater**, *Water Research*, Open Access, Volume 19015, Article number 116748. DOI: 10.1016/j.watres.2020.116748
- > Pous N., Korth B., Osset-Álvarez M., Balaguer M.D., Harnisch F., Puig S. (2021), **Electrifying biotrickling filters for the treatment of aquaponics wastewater**, *Bioresource Technology*, Open Access, Volume 319, Article number 124221. DOI: 10.1016/j.biortech.2020.124221
- > Ceballos-Escalera, A., Pous, N., Balaguer, M.D., Puig, S. (2022), **Electrochemical water softening as pretreatment for nitrate electro bioremediation.** *Science of the Total Environment*, Open Access, 806, 150433. DOI: 10.1016/j.scitotenv.2021.150433
- > Osset-Álvarez, M., Pous, N., Chiluíza-Ramos, P., Bañeras, L., Balaguer, M.D., Puig, S. (2022). **Unveiling microbial electricity driven anoxic ammonium removal.** *Bioresource Technology Reports*, Open Access, 17, 100975. DOI: 10.1016/j.biteb.2022.100975

## Doctoral theses

- > **Carbon and nitrogen treatment in industrial wastewaters using bioelectrochemical systems.** Anna Vilajeliu Pons. 2017. <http://hdl.handle.net/10803/406094>
- > **Bioremediation of nitrate-polluted groundwater using bioelectrochemical systems.** Narcís Pous Rodríguez. 2015. <http://hdl.handle.net/10803/302539>.

## 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.