

SCIENTIFIC PORTFOLIO

Microbial Electrosynthesis Technologies

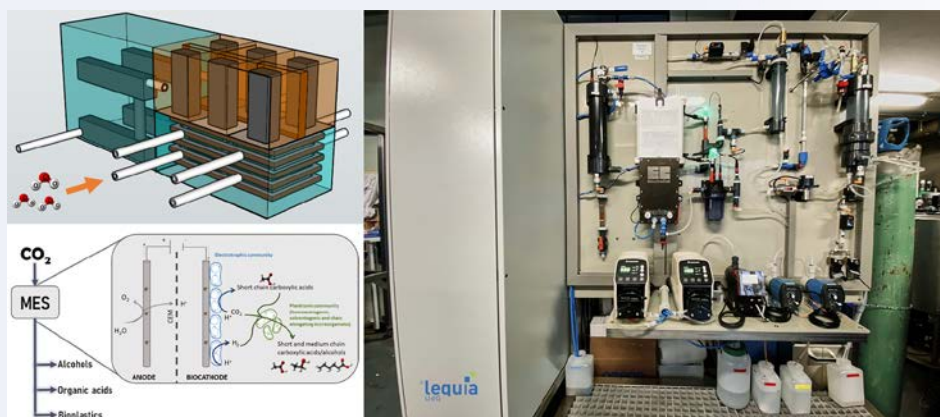
Last update: February 2022

Name of scientists in charge

- > **Dr Sebastià Puig**, Associate Professor "Serra Hünter". sebastia.puig@udg.edu
- > **Dr Maria Dolors Balaguer**, Full Professor. dolors.balaguer@udg.edu
- > **Dr Paolo Dessi**, Marie Skłodowska Curie fellow. paolo.dessi@udg.edu
- > **Dr Luis R. López de León**, Marie Skłodowska Curie fellow. luisrafael.lopez@udg.edu
- > **Dr Jesús Colprim**, Tenured University Professor. jesus.colprim@lequia.udg.cat
- > **Dr Lluís Banyeras**, Tenured University Professor (gEMM research group). lluis.banyeras@udg.edu

Technology description

- > Carbon dioxide capture
- > Indoor air quality
- > Microbial electrosynthesis: from CO₂ to valuable products
- > Biogas upgrading (electromethanogenesis)
- > Fermentation for middle chain carboxylic acid production



Research expertise

- > 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
- > Experience in fermentation biotechnology for middle-chain carboxylic acid production (caproate, valerate)
- > Knowledge of electrochemical characterization techniques (LSV, CV, DPV, EIS)
- > Identification of microbial population through molecular techniques (FISH, SEM, PCRs)
- > Design and development of modules to capture CO₂ from indoor air in order to produce a concentrated stream to feed bioprocesses such as bioelectrochemical technologies to produce commodity chemicals

Most relevant projects

- > **GAIA: Bioelectroconversion of orGAnic waste streams and CO2 into sustaInAble fuels.** Funding entity: Spanish Ministry of Innovation and Science. Call and programme: Lineas Estratégicas. Ref. PLEC2021-007802. 2021-2023.
- > **ATMESPHERE** - Advanced Technology for Microbial Electro-Synthesis of Platform cHemicals and Efficient in-situ Recovery via Electrodialysis. Horizon 2020. H2020-MSCA-IF-2020. 2022-2024. <https://cordis.europa.eu/project/id/101029266>
- > **The Micro-Bio process** - a comprehensive platform to capture CO2 from indoor air, transform it into valuable carbon-neutral commodity chemicals. Horizon 2020. H2020-MSCA-IF-2020. 2022-2024. <https://cordis.europa.eu/project/id/101018274>
- > **SynCorsor4Butanol** - Sustainable Production of n-Butanol by Artificial Consortia Through Synthetic and Systems Biology Approaches. ERANET-CoBioTech. ERANETCobioTech19-31. 2020-2022.
- > **BioReCO2Ver** – Biological routes for CO2 conversion into chemicals building blocks. European Comission. H2020-NMBP-BIOTEC-05-2017. GA 760431. 2018-2022. <http://bioreco2ver.eu>
- > **COOMET – A second chance to CO2: Technological platform based on bioelectrochemical systems.** Spanish National Research Agency (“Retos” programme). RTI2018-098360-B-I00. 2019-2022.

Most relevant publications

- > Blasco-Gómez R., Romans-Casas M., Bolognesi S., Perona-Vico E., Colprim J., Bañeras L., Balaguer M.D., Puig S. (2021), **Steering bio-electro recycling of carbon dioxide towards target compounds through novel inoculation and feeding strategies**, *Journal of Environmental Chemical Engineering*, Open Access, Volume 9, Issue 4, Article number 105549.
- > Rovira-Alsina L., Balaguer M.D., Puig S. (2021), **Thermophilic bio-electro carbon dioxide recycling harnessing renewable energy surplus**, *Bioresource Technology*, Open Access, Volume 321, Article number 124423.
- > Rovira-Alsina L., Perona-Vico E., Bañeras L., Colprim J., Balaguer M.D., Puig S. (2020), **Thermophilic bio-electro CO₂ recycling into organic compounds**, *Green Chemistry*, Open Access, Volume 22, Issue 9, Pages 2947 – 29557.
- > Dessi P., Rovira-Alsina L., Sánchez C., Dinesh G.K., Tong W., Chatterjee P., Tedesco M., Farràs P., Hamelers H.M.V., Puig S. (2021), **Microbial electrosynthesis: towards sustainable biorefineries for production of green chemicals from CO₂ emissions**, *Biotechnology Advances*, Open Access, Volume 46, Issue 107675.
- > Vassilev, I., Dessi, P., Puig, S. and Kokko, M. 2022. **Cathodic biofilms – A prerequisite for microbial electrosynthesis**, *Bioresource Technology*, Open Access, 348, 126788.
- > Paquete, C., Rosenbaum, M., Bañeras, Ll., Rotaru, A. and Puig, S. 2022. **Let´s chat: communication between electroactive microorganisms**. *Bioresource Technology*, Open Access, 347, 126705.
- > Bolognesi, S., Bañeras, Ll., Perona-Vico, E., Capodaglio, A.G., Balaguer, M.D. and Puig, S. 2022. **Carbon dioxide to bio-oil in a bioelectrochemical system-assisted microalgae biorefinery process**. *Sustainable Energy & Fuels* 6(1), Open access, 150-161.