

SCIENTIFIC PORTFOLIO

Autotrophic nitrogen removal from high loaded wastewaters

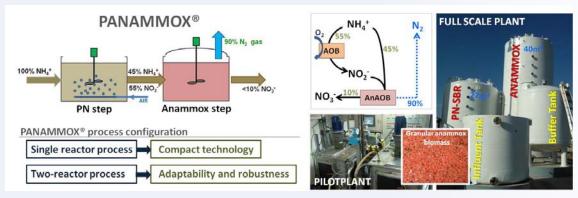
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Name of scientists in charge

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Technology description

- > Autotrophic nitrogen removal from industrial ammonium rich wastewater.
- > Improvement of N-removal efficiency in existing facilities.
- > Reduction of treatment costs (low aeration, carbon source dosage avoided, removal of alkalinity and bCOD)



Overview of the PANAMMOX technology: scheme of the process and leachate treatment plants

Research expertise

- > Development of the PANAMOX® process for autotrophic N removal.
- > Expertise on conditioning of high N strength wastewater with highly variable characteristics previous to anammox reactors. Knowledge about start-up and long term operation of PN-SBR. Knowledge about denitrification via nitrite.
- > Expertise on process design, configuration and operation for industrial wastewater treatment (leachate, sludge digestion returns, manure). Scalability. Studies on process automation. Either 2-step or 1-step PN/anammox configuration.
- > Studies on wastewater with extreme conditions of ammonium content, conductivity, COD (both refractory and biodegradable) and complex matrix.
- > Studies on development of advanced wastewater treatment solutions by combining PN/anammox with other technologies (such as AOPs).
- > Studies on mechanisms and quantifications of nitrous oxide (N₂O). Identification of microbial populations through molecular techniques (FISH, PCR/qPCRs).







Most relevant projects

- > **TreatREC** Interdisciplinary concepts for municipal wastewater treatment and resource recovery. Tackling future challenges. European Commission. H2020 MSCA ITN 2014. GA: 642904. 2015-2018.
- > **N-OPTIMOX:** First demonstration plant of the PANAMMOX® technology applied to the treatment of leachates. Spanish Ministry of Science and Innovation. INNPACTO. IPT-2011-1073-310000. 2011-2014.
- > NIMOX: Partial nitrification and anaerobic oxidation of ammonium by anammox biomass from anaerobic digestion effluents of urban WWTP. Spanish Ministry of Education and Science. DEX-560620-2008-149. 2008-2010.

Most relevant publications

- > Ruscalleda, M., Seredynska-Sobecka, B., Ni, B-J., Arvin, E., Balaguer, M.D., Colprim, J., Smets, B. F. (2014) Spectrometric characterization of the efluent dissolved organic matter from an anammox reactor shows correlation between the EEM signature and anammox growth, *Chemosphere*, 117, 271-277.
- > Gabarró, J.; González-Cárcamo, P.; Ruscalleda, M.; Ganigué, R.; Gich, F.; Balaguer, M.D.; Colprim, J. (2014). Anoxic phases are the main N₂O contributor in partial nitritation reactors treating high nitrogen loads with alternate aeration. *Bioresource Technology, in press.*
- > Gabarró, J., Hernández-del Amo, E., Gich, F., Ruscalleda, M., Balaguer, M.D., Colprim, J. (2013). **Nitrous** oxide reduction genetic potential from the microbial community of an intermittently aerated partial nitritation SBR treating mature landfill leachate. *Water Research* 47 (19), 7066 7077.
- > Anfruns, A., Gabarró, J., Gonzalez-Olmos, R., Puig, S., Balaguer, M.D., Colprim, J. (2013). **Coupling anammox and advanced oxidation-based technologies for mature landfill leachate treatment.**Journal of Hazardous Materials **258-259**, 27 34.
- > Gabarró, J.; Ganigué, R.; Gich, F.; Ruscalleda, M.; Balaguer, M.D.; Colprim, J. (2012). Effect of temperature on AOB activity of a partial nitritation SBR treating landfill leachate with extremely high nitrogen concentration. *Bioresource Technology*, **126**, 283 289.
- > Scaglione, D.; Ruscalleda, M.; Ficara, E.; Balaguer, M.D.; Colprim, J. (2012). **Nitrite inhibition and recovery response of anammox granular biomass adapted to mineral medium and landfill leachate**. *Chemical Engineering Journal*, **209**, 62-68. (13), 414-419.

