

Chemistry Department

Wastewater bioengineering and microbiology

Biochemical and Processes Engineering Group

<http://www.dq.fct.unl.pt/pessoas/investigadores/gilda-de-sousa-carvalho-oehmen>



Gilda Carvalho

Post-doc researcher

- 2001: PhD in Biotechnology
- 1995: Chemical Eng. degree
- PI of 2 FCT/MCES projects
- Co-supervisor of 5 PhD and 4 MSc students
- 39 papers; 458 citations; h-index: 9

Objectives

The main research topic is to investigate and optimise water and wastewater treatment systems for the removal of nutrients (nitrogen and phosphorus) and xenobiotics (pharmaceuticals, personal care products, fertilisers, heavy metals), as well as the application of advanced processes, such as membrane bioreactors.

Special focus is given to the microbial community characterisation of these systems, using microbiology and molecular biology tools for phylogenetic and functional analysis. Ultimately, the research objective is to link process performance and microbial population information to set the basis towards improved wastewater treatment processes.

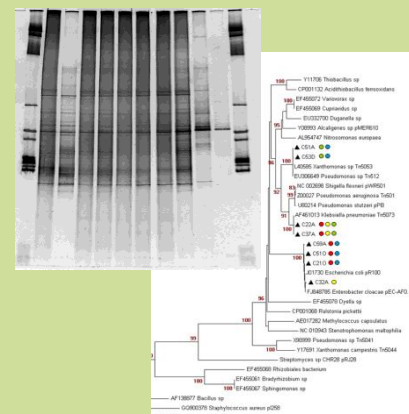
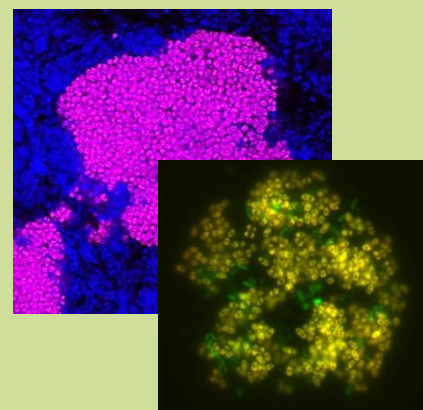
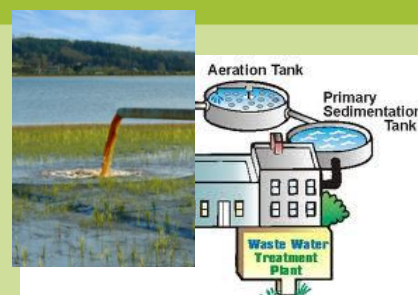
Methodology

Lab- and pilot-scale bioreactors are used to conduct performance tests and acclimatise biomass to specific conditions/pollutants. Part of the research is also carried out directly on wastewater treatment plants (WWTPs).

Microbial characterisation is mostly done using fluorescence *in situ* hybridisation (FISH) and 16S rRNA gene-based techniques (cloning, sequencing, PCR-DGGE). Functional analysis of the communities is carried out through quantitative PCR of specific genes. Phylogenetic and functional investigation is also performed on isolates obtained from bioreactors or WWTPs. Additionally, high throughput sequencing and proteomics are performed in collaboration with national and international partners.

Expected Results

Microbiology and molecular biology tools are used to investigate the composition, diversity and metabolism of the microbial populations involved in pollutant bioremediation. This research approach aims at bridging microbial ecology and environmental engineering. The population dynamics under different operating conditions, combined with microorganism identification and their role in the process, is used to understand the impact of different factors on performance and, ultimately, to optimise the treatment/valorisation process.



Funding:

FP4-ENV4-CT95-0064
POCTI/EQU/32456/99
Australian RC-DP0210502
PTDC/AMB/65702/2006 (PI)

EUROMBRA: FP6-SUSTDEV-2004-
-3.II.3.2.2-018480
PTDC/EBB-EBI/098862/2008 (PI)
PTDC/AAC-AMB/113091/2009

PTDC/EBB-EBI/120624/2010
PTDC/AAC-AMM/120581/2010
EcoBioCap:FP7-KBBE-2010-14
EXPL/AAG-REC/1207/2012