PhD Candidate Profile

Name:
Paulo Henrique Marrocos de Oliveira

Research Group (if relevant):
Thermodynamics and Environment

Research Centre (if relevant):
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Department/School(s) (if relevant):
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College:
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Supervisor(s):
Dr. Vítor Jorge Pais Vilar (Supervisor)

Dr. Ricardo Jorge Nogueira dos Santos (Co-supervisor)

Funding body:
Fundação de Ciência e Tecnologia (FCT), reference 2022.10437.BD

Area (field) of study:
Ozonation, NETmix Static Mixer, Computational Fluid Dynamics, Gas-liquid Mass Transfer, Multiphase Flow

Thesis Title:
Cutting-Edge Ozone Static Mixer based on a Micro/Meso Structured Pressurized NETmix Reactor: Experimental and CFD Modelling

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Abstract:

The increasing global health concerns due to the surge in urbanization, increasing water contamination and world industrialization, are driving the ozone technology market globally. High O3 supply demands and bulky size of equipment constitutes a major impediment to the wide spreading of ozone technology in the water treatment sector. This project will address these issues by developing a disruptive low footprint O3 side stream contacting train for water treatment, integrating a pressurized static micro/meso-structured mixer (NETmix), enabling gas-liquid mass transfer up to 100%, reducing O3 supply demands and the bulk size of reaction chamber. Computational fluid dynamics (CFD) modelling will be used for the design of the NETmix to boost O3 dissolution in the water. The mass transfer enhancement will be delivered by increasing the amount of dissolved O3 in water due to its higher solubility at higher pressure and lower temperature, and by intensifying the degree of gas/liquid mixing.

Collaborations:

N/A

Publications:

Paulo H. Marrocos, Igor G.I. Iwakiri, Márcio A.F. Martins, Alírio E. Rodrigues, José M. Loureiro, Ana M. Ribeiro, Idelfonso B.R. Nogueira. A long short-term memory based Quasi-Virtual Analyzer for dynamic real-time soft sensing of a Simulated Moving Bed unit. Applied Soft Computing, Volume 116, 2022, 108318. https://doi.org/10.1016/j.asoc.2021.108318.

Presentations:

Reduced-Order Modelling Approach Based on Computational Fluid Dynamics to Predict Gas Hold-up in Micro/Meso Structured Static Mixers. EA3G2022 - International Ozone Association Conference & Exhibition, 28-30 November 2022 (France). Authors: Marrocos, P.H.; Fernandes, I.S.; Pituco, M.M.; Lopes, J.C.B.; Santos, R.J.; Vilar, V.J.P.

NETmix Technology For Ozonation: A CFD Modelling Approach - 4to Congreso Colombiano de Procesos Avanzados de Oxidación, 14-15 April 2021 (Colombia). Authors: Marrocos, P.H.; Fernandes, I.S.; Teixeira, C.A.M; Dias, M.; Santos, R.J.; Lopes, J.C.P.; Vilar, V.J.P.