



DEPARTMENT OF CIVIL ENGINEERING

SEMINAR

**Advancements in Reaction Engineering:  
Innovations for Sustainable Solutions**

Dr Antonio Exposito

Department of Chemical Engineering, University of Bath, UK

Date: 27 February 2024 (Tuesday)

Time: 2:00 p.m. – 3:00 p.m.

Venue: Room 632C, 6/F Haking Wong Building, The University of Hong Kong

**ABSTRACT**

Reaction engineering offers solutions to some of the most challenging issues that society is facing. My group applies reaction engineering concepts to solve environmental and industrial challenges. In this presentation, I will showcase some of our recent investigations on catalyst design, testing and evaluation and reactor engineering developments.

I will discuss our results in the design of catalysts for wastewater treatment, focusing on using Advanced Oxidation Processes (AOPs) to remove persistent contaminants from water. We demonstrated the effect of various catalysts, activation methods (such as UV or ultrasound), and reactions to efficiently degrade pharmaceuticals like carbamazepine or antipyrine, evaluating kinetics, operational costs, and long-term efficiency. Additionally, I will highlight our innovative utilisation of piezoelectric materials in pollutant degradation and our strides in treating wastewater plastic. Moreover, I will also discuss the use of catalytic CO<sub>2</sub> electroreduction for ethanol production, emphasising the profitability through simulations, optimising plant components, and identifying feasible conditions for its industrial implementation.

In the area of reactor engineering, I will discuss our investigations on the use of various photocatalytic reactors for wastewater treatment. Furthermore, I will talk about our breakthroughs using microreactors for flow chemistry. I will present our work on a novel method for swiftly synthesising ceria nanoparticles at moderate conditions using deep eutectic solvents and microreactors. This pioneering approach leads to rapid synthesis, high yields, and potential for large-scale sustainable nanoparticle production. Our focus on continuous-flow processes will also showcase the hydrogenation reaction selectivity improvement and control mechanisms advancements. These innovations aim to enhance efficiency and sustainability in chemical reactions, paving the way for transformative progress.

**ABOUT THE SPEAKER**

Dr Antonio Exposito is a Lecturer in Chemical Engineering at the University of Bath (United Kingdom). His research spans advanced oxidation processes for wastewater treatment, microplastics' environmental impact and remediation or innovative reactions using novel reaction configurations. Before Bath, Antonio worked as a postdoctoral researcher at the Universities of Cambridge and Warwick (United Kingdom) and as a PhD student at the University of Castilla-La Mancha (Spain). Antonio also worked as an R&D Engineer at Stoli Chem Ltd.

- ALL ARE WELCOME -