

PhD Candidate Profile

**Name:**

Irene Villarejo Avila

Research Group (if relevant):

Chemical and environmental Engineering Group - Photoners

Research Centre (if relevant):

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Department/School(s) (if relevant):

Chemical and Environmental Technology Department

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Higher School of Experimental Sciences and Technology Mostoles (Madrid)

Supervisor(s):

Javier Marugán Aguado

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Funding body:

European Commission (Grant Agreement N. 101017928) HYSOLCHEM

Area (field) of study:

Sustainable Processes for Effluent Treatment.

Thesis Title:

Simulation and optimization of photoelectrocatalytic processes for water treatment.

Abstract:

The degradation of emerging concern contaminants has gained significance in the processes of wastewater treatment plants. For this purpose, Advanced Oxidation Technologies use the production of radicals to oxidize a large amount of organic contaminants. One of these technologies is photocatalysis, whose main virtue is the use of solar radiation as a non-polluting energy source. The performance of this technology can be increased by combining photocatalysis with electrocatalysis, enhancing the generation of reactive oxygen species within a photoelectrocatalytic cell.

Through Computational Fluid Dynamics (CFD), the simulation of multiple designs and variable conditions is allowed for the optimization of systems, reducing the economic and time costs involved in the physical realization of the models. However, the optimization of conditions dependent on geometries, fluid dynamics or light distribution for this type of models is a field with little development.

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Therefore, this project seeks the validation of an optimal method for the design and computational calculation of fluid dynamics, species transport and reactivity for a photoelectrocatalytic cell. The final objective is the study of the efficiency of the cell and the generation of a protocol that will subsequently be carried out to a photoelectrocatalytic cell for industrial scaling and implementation in real wastewater purification systems.

Collaborations:

N/A

Publications:

N/A

Presentations:

7th Conference on the Promotion of Basic Research for Science and Engineering Students.
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