

## PhD Candidate Profile

**Name:**

Carmen Barquín Díez

**Research Group (if relevant):**

Advanced Separation Processes (PAS)

**Research Centre (if relevant):**

Escuela Técnica Superior de Ingenieros Industriales y de Telecomunicación

**Department/School(s) (if relevant):**

Departamento de Ingenierías Química y Biomolecular

**College:**

University of Cantabria, Spain

**Supervisor(s):**

Dr. María J. Rivero

Prof. Inmaculada Ortiz

**Funding body:**

Spanish Ministry of Science and Innovation. FPI contract PRE2019-089096.

Projects RTI2018-099407-B-I00 and PID2021-122563OB-I00.

**Area (field) of study:**

Removal of contaminants of emerging concern by heterogeneous photocatalysis with improved photocatalysts.

**Thesis Title:**

Challenges in the Implementation of Photocatalysis for Environmental Applications

**Abstract:**

The current increase in world population and in water demand involve remarkable challenges. Contaminants of emerging concern that are not removed in the wastewater treatment plants pose a risk to health or environment. Efficient technologies, such as advanced oxidation processes (AOPs) are necessary. At this point, heterogeneous photocatalysis runs as one promising alternative, as it allows not only the removal of contaminants but also their complete mineralisation. Moreover, we focus on the degradation of halogenated organic compounds, because if halogen atoms are not fully released to the solution, intermediate compounds could be even more dangerous than the initial ones.

The search for new photocatalysts able to maintain its photocatalytic activity after several runs is another question that we try to answer. We propose a magnetically recoverable composite made of titanium dioxide, magnetite and reduced graphene oxide (TiO<sub>2</sub>/Fe<sub>3</sub>O<sub>4</sub>/rGO).



### Collaborations:

N/A

### Publications:

C. Barquín, M.J. Rivero, I. Ortiz, "Shedding light on the performance of magnetically recoverable  $\text{TiO}_2/\text{Fe}_3\text{O}_4/\text{rGO}$ -5 photocatalyst. Degradation of S-metolachlor as case study". *Chemosphere* 307 (2022) 135991.

N. Diban, A. Pacuła, I. Kumakiri, C. Barquín, M.J. Rivero, A. Urtiaga, I. Ortiz, " $\text{TiO}_2$ -Zeolite Metal Composites for Photocatalytic Degradation of Organic Pollutants in Water". *Catalysts* 11 (2021) 1367.

### Presentations:

Congress: ANQUE-ICCE 3 Student Conference. Santander (Spain)

Title: Optimization of waste nitrogen flows and their agricultural application in Cantabria

Authors: Carmen Barquín, Antonio Domínguez-Ramos, Selene Cobo

Contribution: Poster

Date: 17 - 18 june 2019

Congress: 14th Mediterranean Congress of Chemical Engineering (MeCCE). Online

Title: Improved Performance of a Newly Synthesized Magnetite photocatalyst for S-Metolachlor Degradation

Authors: Carmen Barquín, Laura Rancaño, María J. Rivero, Inmaculada Ortiz

Contribution: Oral presentation

Date: 16 - 20 november 2020

Congress: Symposium of the Spanish Royal Society of Chemistry. Online

Title: Synthesis and Photocatalytic Performance of  $\text{TiO}_2/\text{Fe}_3\text{O}_4/\text{rGO}$  composite for the removal of S-metolachlor

Authors: Carmen Barquín, María J. Rivero, Inmaculada Ortiz

Contribution: Poster

Date: 27 - 30 september 2020

Congress: VI Reunión Nacional de Grupos de Fotocatálisis. La Coruña (Spain)

Title: Overcoming Challenges of Photocatalytic Processes

Authors: María J. Rivero, Carmen Barquín, Deva Pelayo, Juan Corredor, Marta Rumayor, Inmaculada Ortiz

Contribution: Oral presentation

Date: 25 - 26 november 2021

Congress: 6th International Symposium on "Green and Smart Technologies for a Sustainable Society". Online

## PhD Candidate Profile

Title: Efficient photocatalytic degradation of the herbicide S-metolachlor with  $\text{TiO}_2/\text{Fe}_3\text{O}_4/\text{rGO}$ -5 composites

Authors: Carmen Barquín, María J. Rivero, Inmaculada Ortiz

Contribution: Oral presentation

Date: 9 - 10 december 2021

Congress: 11th European Conference on Solar Chemistry and Photocatalysis: Environmental Applications (SPEA). Torino (Italy)

Title: New  $\text{TiO}_2$ -Zeolite-Silver Composite Photocatalysts. Dichloroacetic Acid Degradation as Case of Study

Authors: Carmen Barquín, Aleksandra Pacuła, Nazely Diban, María J. Rivero, Inmaculada Ortiz

Contribution: Short oral presentation + poster

Date: 6 - 10 june 2022

Congress: XXXVIII Reunión Bienal Real Sociedad Española de Química (RSEQ). Granada (Spain)

Title: Shedding light on the photocatalytic mechanism of S-metolachlor with  $\text{TiO}_2$ ,  $\text{TiO}_2/\text{rGO}$  and  $\text{TiO}_2/\text{Fe}_3\text{O}_4/\text{rGO}$

Authors: Carmen Barquín, María J. Rivero, Inmaculada Ortiz

Contribution: Poster

Date: 27 - 30 june 2022

Congress: 15th International conference on Catalysis in Membrane Reactors. Tokyo (Japan)

Title: Photocatalytic degradation of model organic water solutions with composite  $\text{TiO}_2$ -Ag inorganic tubular membranes

Authors: Aranza Vital-Grappin, Carmen Barquín, Nazely Diban, María J. Rivero, Izumi Kumakiri, Inmaculada Ortiz

Contribution: Poster

Date: 1 - 4 august 2022

Congress: 5th Iberoamerican Conference on Advanced Oxidation Technologies. Cusco (Peru)

Title: Comparative kinetics of adsorbable and non-adsorbable chlorinated pollutants on  $\text{TiO}_2/\text{rGO}$  photocatalyst

Authors: Carmen Barquín, María J. Rivero, Inmaculada Ortiz

Contribution: Short oral presentation + poster

Date: 7 - 11 november 2022