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### RESEARCH

- **Title: Synthesis and validation of new photocatalysts for organic pollutants removal**

- **Description:**

World population growth and the increasing urbanization demand additional water sources as well as protection of the existing ones. To this end, low cost and high performance remediation technologies must be developed to degrade the wide range of contaminants contained in wastewaters and effluents, e.g organic pollutants, pollutants of emerging concern, herbicides etc.

To solve this problem, it is proposed the use of an advanced oxidation process; heterogeneous photocatalysis, which is based on the generation of hydroxyl radicals ( $\cdot\text{OH}$ ) when a light source irradiates a semiconductor material.

Titanium dioxide has been widely used as photocatalyst, however, its high band-gap makes difficult its application under visible light. Iron oxides stand as candidates for this purpose, specially magnetite,  $\text{Fe}_3\text{O}_4$ , that can enhance the use of sunlight and facilitate the catalyst separation from the reaction medium thanks to its magnetism.

However, recombination of magnetite's electron-hole pairs decreases its photocatalytic activity. In order to avoid the recombination, one strategy consists of combining the metal oxide with a different metal, not metal or carbon-based substance such as reduced graphene oxide, rGO.

This research aims at following a new approach to synthesize low cost and high performance photocatalysts to be used in the degradation of organic pollutants under visible light; in this way the photocatalytic properties of metal oxides are combined with the characteristics of rGO.

- **Congress contributions:**

Barquín, C., Domínguez-Ramos, A., Cobo, S. Optimization of waste nitrogen flows and their agricultural application in Cantabria. ISBN: 978-84-09-12437-4. Congress ANQUE-ICCE 3 Student Conference, June 2019, Santander (Spain). Poster contribution.

- **R&D Projects:**

Title: Retos en la implementación de la fotocatalisis para aplicaciones medioambientales (RTI2018-099407-B-I00)  
Participant entities: University of Cantabria  
Main researcher: María J. Rivero