

01/06/2021

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NEWSLETTER 03

Focus on the University of La Rioja



Miguel Monge Oroz, professor at the University of La Rioja (UR) and researcher in the chemistry « **Group of Study of Metallic Interactions and its Applications** » (GEIMA), is responsible for the NUTRIA's project within the University.

The UR group has hired **two more researchers** for the project. One is focused on the synthesis of new photocatalysts with the ability to absorb visible light through the inclusion of narrow band gap semiconductors and / or metallic nanoparticles. The other focuses his activity on testing the photocatalytic properties of synthesized nanomaterials, analysing the degradation of model molecules or pollutants found in wastewaters from wineries.

Results

The UR group has continued with the preparation and analysis of the photocatalytic performance of new hybrid nanostructures.

Photocatalysts based on $\text{TiO}_2/\text{C}_3\text{N}_4$ supported on magnetic microparticles have been improved by the addition of tiny amounts of a gold molecular precursor during the synthetic process of the nanohybrid. This addition produces the formation of gold nanoparticles within the nanohybrid, providing an improved absorption of visible light.

All the photocatalysts have been tested in the degradation of the benchmark dye methylene blue for comparative purposes, obtaining fast and reliable degradations under LED visible light. Interest has been brought on the efficiency of the photocatalytic treatment with on pollutants present in winery wastewater like polyphenols, obtaining positive results. For example, gallic acid can be easily depleted under visible LED light with the photocatalysts based on $\text{TiO}_2/\text{C}_3\text{N}_4$ (see figure). The team expect a better result with the gold-nanohybrid.

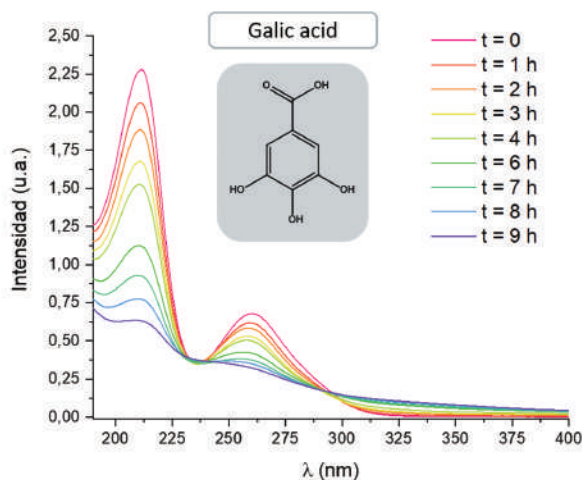


Figure: Degradation of 50 ppm of gallic acid under visible light

A first publication in the NUTRIA project!

The UR group has designed new photocatalysts based on $\text{Au-Ag}/\text{TiO}_2$ nanoparticles and graphene. The introduction of bimetallic plasmonic Au-Ag nanoparticles improves the absorption of visible light. The addition of graphene enhances the adsorption of pollutants and improves the charge-carrier separation and, hence, the photocatalytic efficiency. The results have been published in *New Journal of Chemistry* (DOI: 10.1039/D1NJ01879E).

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Projet cofinancé par le Fonds Européen de Développement Régional (FEDER)