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NEWSLETTER 02

Agenda

The NUTRIA project partners have been working since last summer on the development of new photocatalytic materials that would be able to treat wastewater from small wineries with sunlight.

The first results are presented in this newsletter, and here is what happened outside the labs!

10 novembre 2020, Zaragoza

Conference on challenges and solutions in sustainable wastewater treatment in the wine sector

21 janvier 2021, Zaragoza

Training on Horizon Europe and possibilities for participation of SMEs and universities

01 mars 2021

Upload of the NUTRIA project on social networks



Photocatalysts

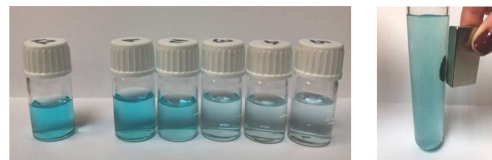
The team from the **University of La Rioja** continues to prepare new hybrid nanostructures that can be used as efficient photocatalysts under sunlight for the degradation of pollutants in wastewater.

Many known photocatalysts show low use of solar energy, which is composed of UV (5%), visible (43%) and IR (52%) radiation. The design of photocatalysts for the NUTRIA project points to the use of a **wide range of wavelengths of sunlight**. For this, several strategies are used, such as the search for new semiconductors with a low band gap, the doping of semiconductors with a wide band gap or the fabrication of hybrid metal / semiconductor nanomaterials.

The team designed a photocatalyst based on **magnetic microparticles** supplied by **Avanzare** and **two semiconductor nanostructures**: TiO₂ nanoparticles capable of capturing UV light and two-dimensional C₃N₄ nanostructures capable of harvesting part of visible light. The manufacturing step allows the **simultaneous grafting of TiO₂ and C₃N₄ on the magnetic microparticles**, thanks to the in situ formation of the C₃N₄ nanostructures which trap the TiO₂ nanoparticles and, at the same time, cover the magnetic microparticles, forming in a one-to-one approach step, the **hybrid nanomaterial**.

Water treatments

The University of La Rioja has carried out the **first photocatalytic tests** by degradation of methylene blue dye under visible light, which is a benchmark experiment in photocatalysis.



Figures : Degradation of methylene blue over time and magnetic separation of the photocatalyst.

The results have been very positive and the team is now working on several axes:

- (i) improving the composition of the photocatalyst by **doping with plasmonic metal nanoparticles** (gold or silver),
- (ii) use of **different light sources** (UV, vis, NIR, etc.),
- (iii) degradation of **pollutants present in wineries wastewater** such as polyphenols,
- (iv) **large-scale synthesis of photocatalysts** in collaboration with **Avanzare**.



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