

Photocatalyst for water cleaning using solar light

CSIC, Autonomous University of Madrid and the University of Castilla la Mancha, have developed a photocatalyst composed of nanoparticles of titanium oxide and graphene, for the degradation of organic contaminants in aqueous solutions, using sunlight as activation source.

Industrial partners interested in licensing the material for its development and commercialization, for water decontamination, are sought.

An offer for Patent Licensing

Sustainable technology

TiO₂ has been widely used as photocatalyst due to its high activity, low cost and good stability. However, the energy of the solar spectrum that can be absorbed by this material does not exceed 5%, therefore, is necessary to look for new strategies of synthesis and preparation for maximizing the use of the sunlight.

In this case, a new material has been developed by combining a few layer graphene (FLG) with TiO₂ nanoparticles, through a specific procedure that results in an increase in photo-efficiency under visible light radiation, creating a composite material where the energy required for the photo-excitation can be obtained directly from the sun. This new material is capable of reaching a complete oxidation of organic pollutants such as pesticides or herbicides to CO₂ and H₂O.

The activity of the nanocomposite material was tested with some pesticides reaching 57.5% of molar conversion of total organic carbon (TOC) after 5 hours of reaction, with the removal of more than 98% for isoproturon, alachlor and pyrimethanil and more than 88% for methomyl. Likewise, 82% conversion was reached after 9 hours of reaction.



Discharge pipe (source: USAD)

Main innovations and advantages

- The procedure for obtaining the material is simple and sustainable, as it starts directly from nanoparticles of TiO₂ and graphene
- The specific synthesis also avoids the production of waste and reduces time and energy compared with other procedures
- The material shows high stability in an aqueous medium and its easy recovered by sedimentation
- The organic contaminant removal process uses sunlight as an energy source
- The photo-oxidation of pollutants takes place at ambient temperature and pressure
- The technology is applicable to aqueous effluents contaminated with organic compounds

Patent Status

Priority patent application filed suitable for international extension

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