Patent: BIOCIDE NANOSTRUCTURES

Holders: Universidad Pablo de Olavide and Consejo Superior de Investigaciones Científicas

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Description

Researchers of Department of Physical, Chemicals and Natural Systems, Universidad Pablo de Olavide (UPO) in collaboration with Consejo Superior de Investigaciones Científicas (CSIC) have developed a method for obtaining nanostructures actives with visible light and short exposure times of radiation, are capable of inhibiting the growth of algae and bacteria in colloidal suspensions and surfaces. Nanostructures obtained, have applications as a biocide in cooling towers to prevent the spread of Legionella, in health facilities, in cleaning products, as a preservative in food, in plants of water treatment, etc.

Need or problem solved

Therefore, new biocide nanostructures have been developed. They are formed by titanium oxide, active carbon and silver presented advantages of each component separately, and also synergetic advantages of joining components

Among compounds that can act as biocides, and particularly within those who base their role in degradation of microorganisms by photocatalytic ability, titanium dioxide present low cost, lack of toxicity and high stability. However, TiO2 has disadvantage of requiring UV light to induce photocatalysis, limiting their activity.

Novel nanostructures with photocatalytic capacity based on TiO2 nanoparticles represent an improvement in this way since they are able to induce photodegradation, with visible light and short time of exposure to radiation, both bacteria and algae in colloidal suspensions and surfaces.

Besides TiO_2, novel nanostructures incorporated activated carbon and silver, increasing photocatalytic efficiency and allows overcoming limitations such as catalytic activity levels lower than expected; irradiation times higher, or algae or bacterial degradation but not simultaneously.

Innovative issues/Competitive advantages

- Fast and simple procedure for obtaining novel nanostructures: one-step and without requiring any complex equipment, are obtained novel nanostructures capable of degrading algae and bacteria, both in suspension in liquids.
- Novel nanostructures have advantages of each component separately and also advantages of synergetic effect of components mixture.
- Among components of nanostructures is activated carbon that makes antibiotic effect much greater.
- Degradation of bacteria and algae is more efficient than with nanostructures which have only silver and titanium dioxide.

- Broad spectrum of activity: degradation of a variety of bacteria such as *Escherichia coli, Klebsiella pneumoniae, Salmonella typhimurium, Bacillus megaterium, o Micrococcus luteus*, and red and green algae in the same nanostructure.
- Degradation can be carried out under visible light, it is not necessary to use UV light sources.
- Use of these novel nanostructures is compatible with other organisms such as fish

Types of interested companies

Novel nanostructures obtained have applications as a biocide in cooling towers to prevent the spread of Legionella, in health facilities, in cleaning products, as a preservative in food, in water treatment plants, etc.. so that might be of interest to:

- Health Sector
- Companies in the food industry
- Hospitality Sector
- Food sector
- Water Treatment Plants
- Chemical companies
- Groups or research centres

Development level

Available for customer. Looking for Industrial partners for patent license