TiO_2 microspheres, and their use as a solar photocatalyst

CSIC has developed a simple and scalable TiO_2 microsphere synthesis method carried out entirely at room temperatura. The obtained microspheres have a high specific Surface, a reactivity greater than the dispersed nanoparticles and an ease handling and recovery. The efficiency has been tested in three different fields of application: water decontamination, hydrogen generation, biomedical applications.

Chemical and biotechnological industrial companies that manufacture reagents for industrial catalytic processes, interested in collaboration through a patent licence agreement are sought.

An offer for Patent Licensing

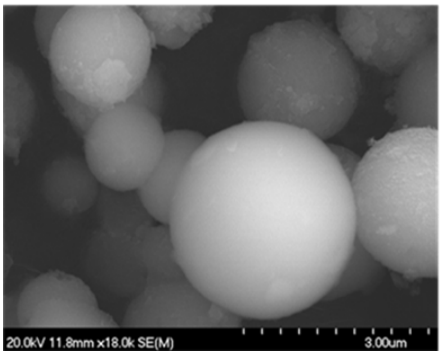
Ultra-active nanostructured TiO_2 photocatalysts

Currently there are no photocatalysts that, in addition to being efficient, are easy to produce on a large scale. Its efficiency at relevant levels is only achieved with nanoparticles of materials that are scarce and expensive and difficult to recovery once the process has finished.

The patent describes a simple TiO_2 microsphere synthesis method carried out entirely at room temperature. It is based on the controlled incorporation of traces of atmospheric water into a Ti solution to promote the self-organization of nanometric particles in the form of micrometer sized mesomeric spherical units with a high specific surface that allows a predominant exposure of the most photoactive faces of TiO_2

The mixture of TiO_2 anatase and brookite polymorphs allows for a reactivity greater than the dispersed nanoparticles.

The high photoactive response occurs in units of micrometer size. facilitating their handling, manipulation and subsequent recovery.



A homogeneous and monodisperse population of micrometer-sized spheres

Main applications

- **Water decontamination** (phenol, paracetamol and azithromycin). The behavior of the microspheres compared to that of commercial TiO2 nanoparticles significantly improves the decomposition (mineralization) time and diminishes the formation of intermediate by-products.
- **Generation of green hydrogen.** Using the microspheres a continuous production of hydrogen was obtained without using co-catalyst and decreasing the sacrificial agent (methanol) by an order of magnitude. Commercial nanoparticles did not produce hydrogen in the absence of co-catalyst
- **Biomedical applications.** The microspheres have been tested as a reagent in already established analytical protocols for the detection of tumor cells. They have given very promising results, shortening the analysis time, going from days to hours.

Patent Status

Priority patent application with the possibility of international extension

For more information, please contact:

Marisa Carrascoso Arranz

Deputy Vice-Presidency for Knowledge Transfer

Spanish National Research Council (CSIC)

Tel.: +34 915681533

E-mail: macarrascoso@orgc.csic.es
comercializacion@csic.es