Patent: Metal nanoparticles functionalised with fluorescent organic molecules

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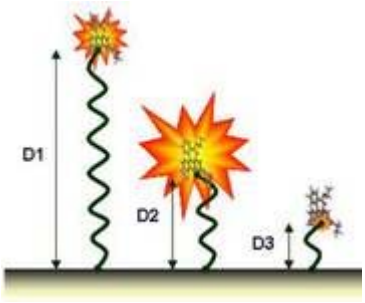

Description

This deals with new **metal nanoparticles functionalised with fluorescent organic molecules** obtained in a simple manner, in a single stage, by the dissolution of metallic salts **(silver, gold, aluminium, platinum, cobalt and palladium)** by their treatment in a water medium with a reducing agent in the presence of a fluorescent organic molecule. They can be used in **detection tests employing fluorescence techniques**, and are noted because they possess the **advantages** of **metal nanoparticles** and of ***Quantum Dots***.

Need or problem solved

- Detection by means of fluorescence techniques serves as a basis of most of the biological tests currently available. However, at a molecular level, fluorescent detection shows serious limitations deriving from the use of organic fluorophores and its high "*photoblinking*". As an alternative, *Quantum Dots* (QD) are becoming more and more relevant; these are also nanoparticles but they evidence important limitations, such as the complexity of their synthesis, low stability in water media, difficult functionalisation and toxicity. The nanoparticles in this invention imply an **alternative to traditional detection by fluorescence at the molecular level through the use of organic fluorophores or the utilisation of *Quantum Dots (QD)*.**
- These metal nanoparticles with fluorescent properties serve as **markers both for fluorescence and for surface-enhanced spectroscopies (SERS and SEIR).**
- They allow the **detection** of **oncological biomarkers** in the organism.
- They can be used for the **diagnosis and the treatment of diseases,** as they are **capable of joining to drugs and biomolecules of pharmacological interest, such as antibodies, proteins**, etc. Thus, these functionalised nanoparticles could be selectively directed to the site of action of the joined drug and even protect it from possible degradation in the organism, also joining certain antibodies.
- Nanoparticles can be functionalised for the **detection of contaminants,** using either fluorescent techniques or surface-enhanced spectroscopy.

Innovative issues/Competitive advantages

- **Obtained by a simple, single-stage method**.
- In these nanoparticles, **the fluorophore is not deactivated by the proximity of metals**. The proximity of the fluorophore leads to increase both the intensity of the fluorophore emission and its stability, a feature that makes them a good alternative to the use of "conventional" organic fluorophores.
- **They are stable in a water medium, capable of functionalisation with other molecules of interest (such as antibodies in biomedical applications) and they are biocompatible**.
- In addition to the well-known fluorescence techniques, these nanoparticles can also (and will preferably) **be detected by means of other techniques, specifically UV-Vis, IR and Raman.**

- **They possess both the typical advantageous properties of metal nanoparticles** (intensive surface plasmon in the visible spectrum, capacity to be detected by enhanced-surface spectroscopy) **and those of *Quantum Dots*** (intensive fluorescence).

Types of interested companies

- The invention may be of interest to companies in the bio-health sector, since nanoparticles are capable of functionalisation with other molecules of interest, such as antibodies in biomedical applications.
- Research units
- Hospitals
- Companies in the chemical or environmental sectors for the detection of contaminants