

Metal nanoparticles functionalized with fluorescent organic molecules

CSIC organization and University Pablo de Olavide have developed new metal nanoparticles functionalized with fluorescent organic molecules, whose fluorescence is not turned off by the proximity of the metal, stable in aqueous medium, which may be functionalized with molecules of interest (eg antibodies for biomedical applications) and biocompatible. These nanoparticles can be detected by other techniques other than fluorescence like UV-Vis, IR and Raman.

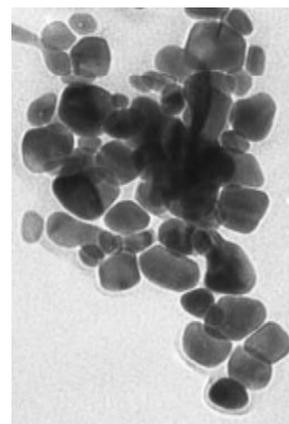
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Easy fabrication and detection

The present invention provides a simple method of obtaining, in a single-step process, metallic nanoparticles with fluorescent properties, from solutions of metal salts, such as silver, gold, copper, aluminum, platinum, cobalt and palladium salts, all of which are cheap and readily available. On the other hand, the process involves the incorporation of polymers which are attached to the nanoparticle surface, giving it stability in aqueous medium and providing a first organic layer useful for subsequent functionalization processes.

These fluorescent nanoparticles are biocompatible and easily functionalized with molecules and biomolecules of interest, so they can be used for fluorescence detection tests. They are also notable for having both the advantageous properties of metal nanoparticles (intense surface plasmon in the visible, that allows them to be detected by amplified surface spectroscopy) and those of Quantum Dots (intense fluorescence), overcoming the limitations of current fluorescence detection techniques, such as a low signal/noise ratio, low photostability of the fluorophores and high photoblinking (annihilation of the fluorescence by a high light intensity).

The nanoparticles allow to develop techniques for detecting analytes such as molecules, cells, viruses, bacteria, proteins, enzymes, peptides, amino acids, nucleic acids, nucleotides, carbohydrates, antibodies, antigens, drugs or similar.



“In addition to the known techniques of fluorescence, the new functionalized metal nanoparticles can also be detected by other techniques such as UV-Vis, IR and Raman”

Main innovations and advantages

- Simple and single-step method.
- The fluorophore is not turned off by the proximity of metal, as occurs in “traditional” organic fluorophores.
- Stable in aqueous media.
- Can be functionalized with other molecules of interest (eg antibodies for biomedical applications).
- Biocompatible.
- They present intense surface plasmon in the visible range and intense fluorescence.
- They can be detected by techniques other than traditional fluorescence as UV-Vis, IR and Raman.
- The precursors used in the manufacturing process are cheap and readily available.

Patent Status

Spanish patent application filed.

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