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Formation of Nanoparticles and Decoration of Organic Crystals

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Reference work entry

Abstract

In the last decades, nanoparticles have been of great research interest due to their unique quantum size effect and optical, electronic, magnetic, and supramolecular properties.

In recent year, the face-selective adhesion of gold nanoparticles onto the crystal faces of organic crystals, also called “decoration” has been reported for first time. The organic single crystals may have surfaces with different chemical nature, allowing the opportunity to explore a wide variety of composite materials with highlights on anisotropic properties.

The metal nanoparticle preparation methods can be classified as chemical and physical methods. Chemical methods consist mainly in the decomposition or precipitation of inorganic salts. For example, it is possible to obtain gold nanoparticles from a gold precursor like HAuCl_4 . Physical methods involve principally the production of gas phase atoms or clusters by diving of the bulk material. Other remarkable preparation method is the sputtering, where a high-purity metal target is bombarded with argon ions, followed by the subsequent deposition of the sputtered metal atoms on the surface of a substrate support to create a uniform dispersion of nanoparticles. This technique has some advantages over other preparation methods like the no contamination from solvent or precursor molecules on the surface. Also, the process is economical and environmentally friendly, since the metal excess is recoverable from the chamber and without liquid waste.

Keywords

Cyclodextrin

Inclusion compounds

Metal nanoparticles

Nanodecoration

Sputter deposition

Functionalized surface

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