



Gold Nanoparticles for Physics, Chemistry and Biology

Catherine Louis, Olivier Pluchery

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The fascination with gold is a story which spans millennia, however scientists have recently found a new interest for gold when it is divided into minuscule grains, such as gold nanoparticles. This scientific enthusiasm started in various fields of science in the middle of the 1980s and the present book offers a panorama of the major scientific achievements obtained with gold nanoparticles.

Various topics are reviewed such as: gold nanoparticle preparation methods, their plasmon resonance and thermo-optical properties, their catalytic properties, their use in biology and medicine as well as their possible toxicity and, finally, their future technological applications. The book also contains an in-depth study of the use of gold nanoparticles throughout the ages, starting from times where the concept of nanoparticles was beyond the realm of human imagination. All these topics are presented by world-class scientists within a set of self-contained chapters.

This book may be used as an advanced textbook by graduate students and scientists who need an introduction to gold nanoparticles. It is also suitable for experts in the related areas of chemistry, biology, material science, optics and physics, who are interested in broadening their knowledge and who wish to have an overview of the subject. Each chapter gradually leads the reader from the basics of a topic towards some of the current scientific challenges in the area. The necessary background material to achieve a solid understanding of each topic and the scientific literature to go further in the field is provided.

Contents:

- Gold Nanoparticles for Physics, Chemistry and Biology
- Gold Nanoparticles in the Past: Before the Nanotechnology Era (*Catherine Louis*)
- Introduction to the Physical and Chemical Properties of Gold (*Geoffrey C Bond*)
- Optical Properties of Gold Nanoparticles (*Olivier Pluchery*)
- Photothermal Properties of Gold Nanoparticles (*Bruno Palpant*)
- Synthesis of Gold Nanoparticles in Liquid Phase (*Daeha Seo and Hyunjoon Song*)
- Chemical Preparation of Gold Nanoparticles on Surfaces (*Catherine Louis*)
- Catalytic Properties of Gold Nanoparticles (*Geoffrey C Bond*)
- Surface Structures of Gold Nanoparticles (*Shamil Shaikhutdinov*)
- Theoretical Studies of Gold Nanoclusters in Various Chemical Environments: When the Size Matters (*Hannu Häkkinen*)
- Optical and Thermal Properties of Gold Nanoparticles for Biology and Medicine (*Romain Quidant*)
- Gold Nanoparticles for Sensors and Drug Delivery (*Christian Villiers*)
- What About Toxicity and Ecotoxicity of Gold Nanoparticles? (*Marie Carrière*)
- Technological Applications of Gold Nanoparticles (*Michael Cortie*)

Readership: Graduate students, young scientists and experts in related areas of chemistry, biology, material science and physics who need an introduction to gold nanoparticles.

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