A Method for Gold Coating of Rare Earth Nano-Phosphors and Uses Thereof

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ABSTRACT

A robust one pot method for coating gold on to an upconverting phosphor.

FULL DESCRIPTION

Researchers at the University of California, Davis have developed novel core-shell architecture nanoparticles that consist of a gold shell and a phosphor core. These particles are developed using a simple, robust one pot water based technique to coat gold on rare-earth fluoride containing nanometer sized phosphors. The uncoated phosphors are white, while the gold coated phosphors have distinct reddish tints that arise from the surface plasmon resonance of the gold shell. The tunable visible color together with the phosphor emission offers numerous possible applications.

APPLICATIONS

The gold shell and phosphor core nanoparticles are environmentally stable due to the gold shell and are biocompatible. The phosphor core can be doped with many lanthanides to provide a high degree of multiplexed labeling in conjunction with the visible color. These materials can potentially be used for multiple applications. For example such particles can serve as the state-of-the art, anti-counterfeiting markers, as biological markers with an open platform to tag cells, DNA, protein and tissues, as sensors for measuring temperatures in small volumes and areas for example microfluidic devices and as thermal energy dosimeters for cancer therapy based on hyperthermia.

FEATURES/BENEFITS

- The particles provide two levels of security – visible color and a response to invisible infra-red light.
- Additional levels of security can be encoded in the form of shape of the particles, size of the particles and use of different wavelengths to tune the response of the particle to invisible light.

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OTHER INFORMATION

KEYWORDS

Gold Coating, Rare earth phosphors, Lanthanides, Biological markers, Anti-counterfeiting markers, Heat actuator sensors, Core-shell nanoparticles

CATEGORIZED AS

- **Engineering**
  - Engineering
- **Imaging**
  - Medical
  - Security
- **Materials & Chemicals**
  - Nanomaterials
- **Nanotechnology**
  - Materials
  - NanoBio

- Requires the use of low-powered lasers, hand held laser sources or light emitting diodes (LEDs).
- Using various possibilities of coding, more information can be encoded per square area than that exists today.
- The particles prevent damage to the biological molecules and reduces background signal due to any background fluorescence.
- The particles do not photo-bleach, thus improving the sensitivity and reliability of the data.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,175,170	01/08/2019	2010-181
United States Of America	Issued Patent	9,034,204	05/19/2015	2010-181

RELATED CASES

2010-181-0

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