

## **Highlight: Superparamagnetic Gold Nanoshells with Tunable Optical Properties**

May 11 2010



TEM images showing the evolution of Au nanoshells after 12 cycles of seeded growth.

A solution-phase process has been developed by CNM users from the University of California at Riverside, working collaboratively with the Nanophotonics Group at the Argonne National Laboratory, for synthesizing stable multifunctional colloidal particles composed of a superparamagnetic Fe3O4 core, a gold nanoshell, and a mesoporous silica outer layer.

The unique porous <u>silica</u> layer is produced by a surface-protected etching process.

By tuning the pore structure of the silica networks through etching, the shape and size of the <u>gold nanoparticles</u> can be controlled during the



seeded growth, as well as their interparticle plasmon coupling.

Controllable interparticle coupling enables "hot spots" for surface enhanced Raman scattering.

The inclusion of responsive superparamagnetic  $Fe_3O_4$  cores broadens the applications to include magnetically guided delivery and <u>magnetic</u> resonance imaging. The evolution from gold seeds to complete shells, and the corresponding change in plasmon bands, can be precisely controlled by the number of growth cycles and silica shell porosity.

More information: Q. Zhang, J. Ge, J. Goebl, Y. Hu, Y. Sun, and Y. Yin, Adv. Mater., 22, 1905 (2010).

Provided by Argonne National Laboratory

Citation: Highlight: Superparamagnetic Gold Nanoshells with Tunable Optical Properties (2010, May 11) retrieved 2 May 2024 from https://phys.org/news/2010-05-highlight-superparamagnetic-gold-nanoshells-tunable.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.