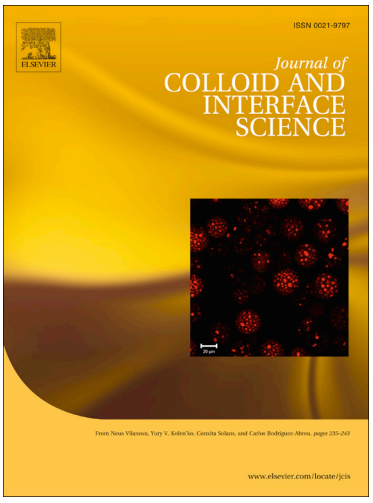

Regular Article

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Broadening the Photoresponsive Activity of Anatase TiO_2 Particles via Decoration with Partial Gold Shells

Orawan Khantamat,[a,b,†] Chien-Hung Li,[a,†] Si-Ping Liu,[c] Tingting Liu,[a] Han Ju Lee,[a] Oussama Zenasni,[a] Tai-Chou Lee,[c] Chengzhi Cai,[a,*] and T. Randall Lee[a,*]

[a]*Department of Chemistry and the Texas Center for Superconductivity, University of Houston, Houston, Texas 77204-5003, USA*

[b]*Department of Biochemistry, Faculty of Medicine, Chiang Mai University, Chiang Mai 50200, Thailand*

[b]*Department of Chemical and Materials Engineering, National Central University, Jhongli City 32001, Taiwan*

Abstract

Titanium dioxide (TiO_2) has gained an increasing interest in material research due to its outstanding properties and promising applications in a wide range of fields. In this perspective, we report the synthesis of custom-designed anatase TiO_2 submicrometer particles coated with partial Au shells ($ATiO_2$-AuShl). The synthetic strategy used herein yield uniformly shaped monodisperse particles. Amorphous TiO_2 core particles were synthesized using template free oxidation and hydrolysis of titanium nitride (TiN), and their subsequent hydrothermal treatment generated anatase TiO_2 ($ATiO_2$) particles. Coating $ATiO_2$ particles with partial Au shells was accomplished using a simple seeded-growth method. Evaluation of optical properties of these $ATiO_2$-AuShl particles showed that our submicrometer composite exhibited an intense absorption peak for TiO_2 in the UV region (~326 nm) and a broad extinction band in the visible range (~650 nm) arising from the incomplete Au shell. These $ATiO_2$-AuShl composite particles provide a unique and effective means for broadening the optical response of TiO_2-based nano- and micron-scale materials. The simplicity of our synthetic method should broaden the application of $ATiO_2$-AuShl particles in various visible light-driven technologies.

Keywords: TiO_2, partial gold shells, visible light, photocatalysis, plasmon resonance

[†]These authors contributed equally to this work.

*Corresponding Author E-mail: cai@uh.edu (C. Cai) or trlee@uh.edu (T. R. Lee)