

Center for Quantum Science and Engineering (CQSE)

Weekly Seminar
June 4, 2010 (Friday)

Time: June 4, 14:30 ~ 15:30

Title: 金奈米粒子表面電漿子之化學鍵節效應及其對螢光閃爍影響
Surface Plasmon Resonance of Gold Nanoparticles: Effect of
Chemical Bonding and its Influence on Blinking
Photoluminescence

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Place: Rm716, CCMS & New Physics Building, NTU

Abstract

We observe surface plasmon resonance splitting due to the covalence and π -bonding electrons conjugated effect. When surfactantless Au NPs are linked on the glass substrate by sulfur, the SPR peak is split from one mode into two modes. The binding energy of 3s electrons for sulfur atoms has a huge red-shift in XPS peaks to confirm the π -bonding electrons conjugated effect. Furthermore, a proposed classical coupling dielectric function model, adding the gold-sulfur covalence bonding effect and conjugated π -bond electrons from sulfur to gold into the Drude model, is achieved to explain the mechanism of the SPR split phenomenon. The surface plasmon resonance (SPR) effect on the blinking emission of photoluminescence from noble metal nanostructures is still an open question in quantum mechanics and limits their applications. We investigate the one photon luminescent emission intermittency of noble metal nanostructures with different sized sea-urchin-shaped nanoparticles, nano-sea-urchins (NSUs). The probability of "on" process in one photon luminescent emission intermittency of NSUs increases due to the strong electric field of SPR. The mechanism is explained by our proposed reaction potential threshold model.

