Canadian Association of Physicists

Association canadienne des physiciens et physiciennes

Contribution ID: **3325** Type: **Oral not-in-competition (Graduate Student) / Orale non-compétitive (Étudiant(e) du 2e ou 3e cycle)**

Transient nonlinear optical properties of nanostructures made of quantum dots and metallic nanoparticles

Thursday 9 June 2022 11:30 (15 minutes)

Recently, transient nonlinear optical properties of quantum dots have attracted much attention in photonic and plasmonic studies. We have investigated the effect of the decay rate, surface plasmon polariton (SPP) coupling strength, and dipole-dipole interaction (DDI) strength on the time-dependent behavior of the power emitted from a three-level lambda-type quantum dot in plasmonic nanohybrids composed of metallic nanoparticles and quantum dots. We introduced the quantum density matrix elements that are directly related to power emission in order to present the results. By controlling the SPP and DDI coupling constant as well as the decay rate, we plotted the time evolution of density matrix elements and found that the strength of SPP coupling and decay rate do not affect the time that the system takes to reach the steady state, whereas the DDI couping strength does. The transient behavior also exhibits giant oscillations and significant enhancement in power emission. The present findings can be used in the development of nanotechnology and the fabrication of nanodevices such as nanosensors and nanoswitches.

Primary authors: SINGH, Mahi (Western); FANG, Ningyan

Presenter: FANG, Ningyan

Session Classification: R2-5 Materials Synthesis and Characterization (DCMMP) | Synthèse et caractérisation de matériaux (DPMCM)

Track Classification: Technical Sessions / Sessions techniques: Condensed Matter and Materials Physics / Physique de la matière condensée et matériaux (DCMMP-DPMCM)