

Physics Research and Technology

Breakthrough Research and Technologies in Physics for a Sustainable Future



Koyel Ganguly
Soumyadipta Pal
Kamakhya Prasad Ghatak
Editors

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Chapter 3

Unveiling the Novelty of Plasmon-Exciton Coupling in Hollow Gold Triangular Platelets and Cyanine Dye J-Aggregates Nanocomposites

Arpan Maiti*
Biswarup Gourd
and Spandan Aich

Centre of Excellence in Multifunctional Materials and Devices,
Department of Basic Science and Humanities, Institute of Engineering & Management,
University of Engineering and Management, New Town, Kolkata, India

Abstract

Hollow gold nanoparticles have recently garnered significant interest due to their unique optical properties. The capacity of these particles to maintain powerful amplified electromagnetic fields at the nanostructure's surface has drawn much interest in surface-enhanced spectroscopies, photothermal treatment, solar cells, and catalysis. The field generation depends on the physical properties of the nanoparticles and can thus be easily adjusted to suit specific needs. We examined the potential for detecting strong plasmon-exciton coupling using hollow gold nanotriangular (HGNT) platelets and cyanine dye J-aggregate nanocomposites. Several sets of HGNT platelets with different aspect ratios were synthesised by varying the seed concentration to observe the coupling behaviour. Hybrid nanosystems were created by adhering and assembling 1,1'-diethyl-2,2'-cyanine (also known as pseudocyanine, or

* Corresponding Author's Email: arpanmaiti25@gmail.com

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information at the nanoscale. By tuning the properties of these hybrid states, researchers can achieve control over quantum information processes, helping advancements in quantum computing and communication. This is a great launching pad for future research based on specific applications of the hybrid plexitons.

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