

Supporting Information of Strong Coupling with Directional Absorption Features of Ag@Au Hollow Nanoshell/J-Aggregate Heterostructures

Linchun Sun^{1†}, Ze Li^{1†}, Jingsuo He¹ and Peijie Wang^{1*}

¹ *The Beijing Key Laboratory for Nano-Photonics and Nano-Structure,
Department of Physics,
Capital Normal University, Beijing 100048, China;*

[†] *Co-first authors.*

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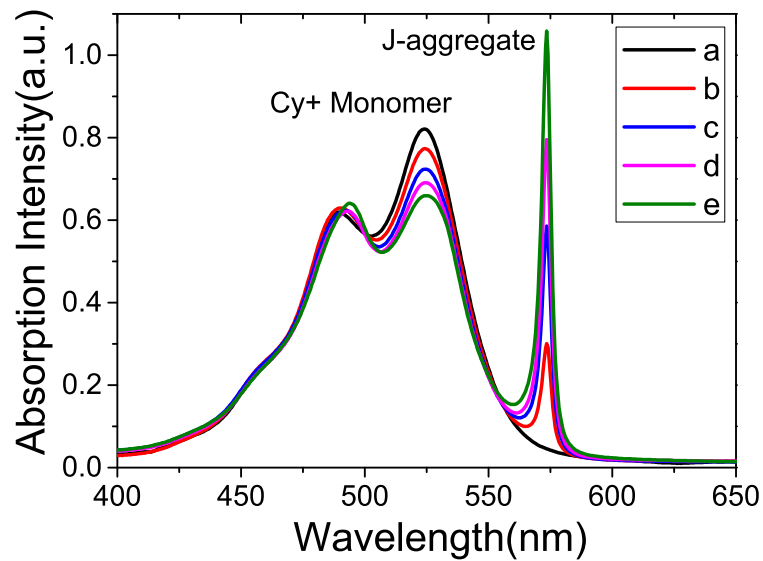


FIG. 1: Absorption spectral changes of pristine 1,1'-diethyl-2,2'-cyanine iodide (Cy+) with temperature cooling from 85 °C to 20 °C every 20 seconds, presented as curves a, b, c, d, and e. Here, the two absorption peaks at the lower wavelengths of 500 and 530 nm are attributed to the monomer molecule Cy^+ . A new band appears at 575 nm which has a sharp Lorentzian lineshape due to the J-aggregate.

*Electronic address: pjwang@cnu.edu.cn

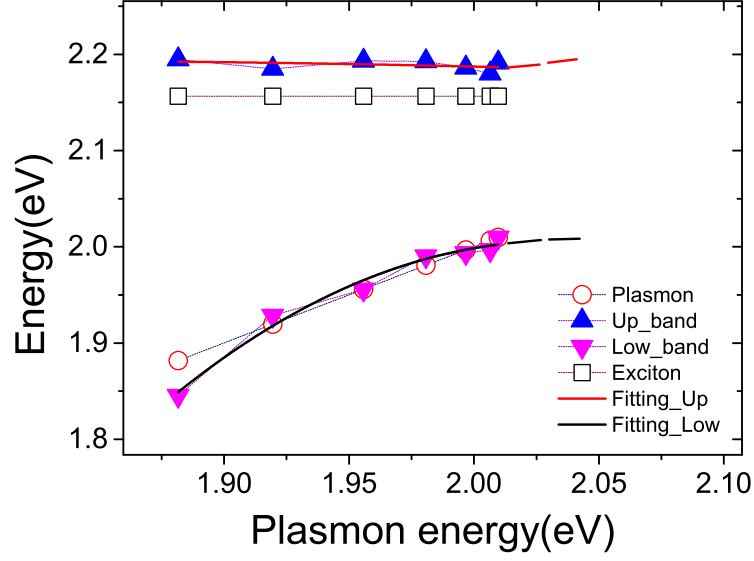


FIG. 2: Experimental dispersion curves of the hybrid state energies of the second SC (curves p to x in Fig.2(B)) plotted as a function of the corresponding plasmon resonance. Anticrossing analysis of the plexciton with upper branch ω_+ (the solid blue triangular symbol) and lower branch ω_- (the solid pink triangular symbol); the circle and the square patterns illustrate the uncoupled exciton and plasmon, respectively. Here, the Rabi splitting is 180 meV.

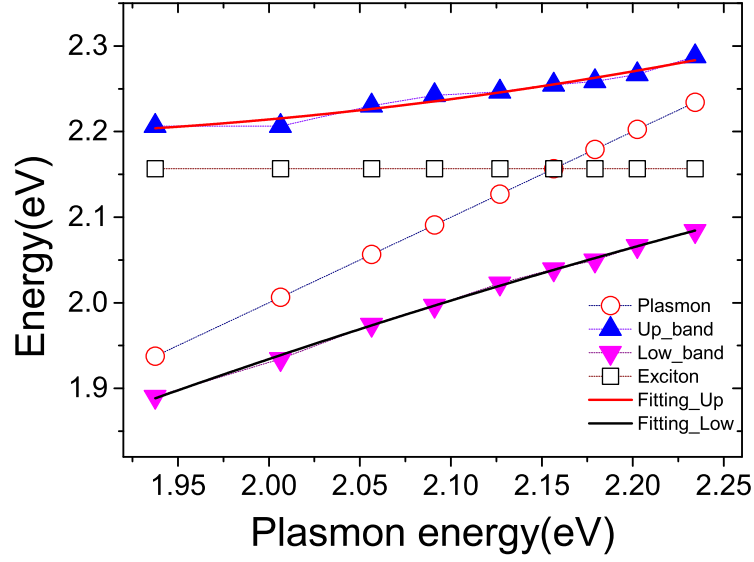


FIG. 3: Simulation dispersion curves of the hybrid state energies of the second SC (curves p to u in Fig.3 (B)) plotted as a function of the corresponding plasmon resonance. Anticrossing analysis of the plexciton with upper branch ω_+ (the solid blue triangular symbol) and lower branch ω_- (the solid pink triangular symbol); the circle and the square patterns illustrate the uncoupled exciton and plasmon, respectively. Here, the Rabi splitting is 210 meV. The corresponding SPR mode volume is 9229 nm^3 .