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Supplementary Materials

Plasmon-induced modulation of the emission spectra of the fluorescent molecules near gold nanorods

*Lei Zhao, Tian Ming, Huanjun Chen, Yao Liang, and Jianfang Wang**

Department of Physics, The Chinese University of Hong Kong, Shatin, Hong Kong SAR, China

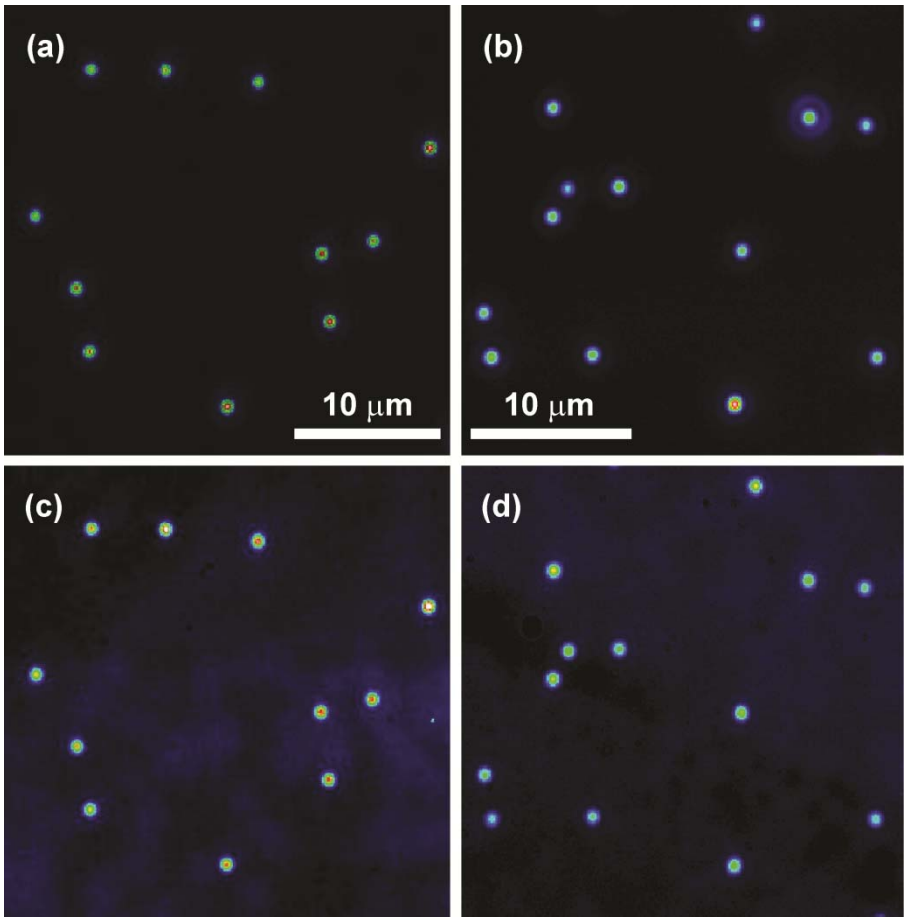

Fig. S1. (a, b) Typical scattering images of the big and small hybrid nanostructures distributed randomly on glass slides, respectively. (c, d) Corresponding fluorescence images that were recorded from the same regions as the scattering images in (a, b), respectively.

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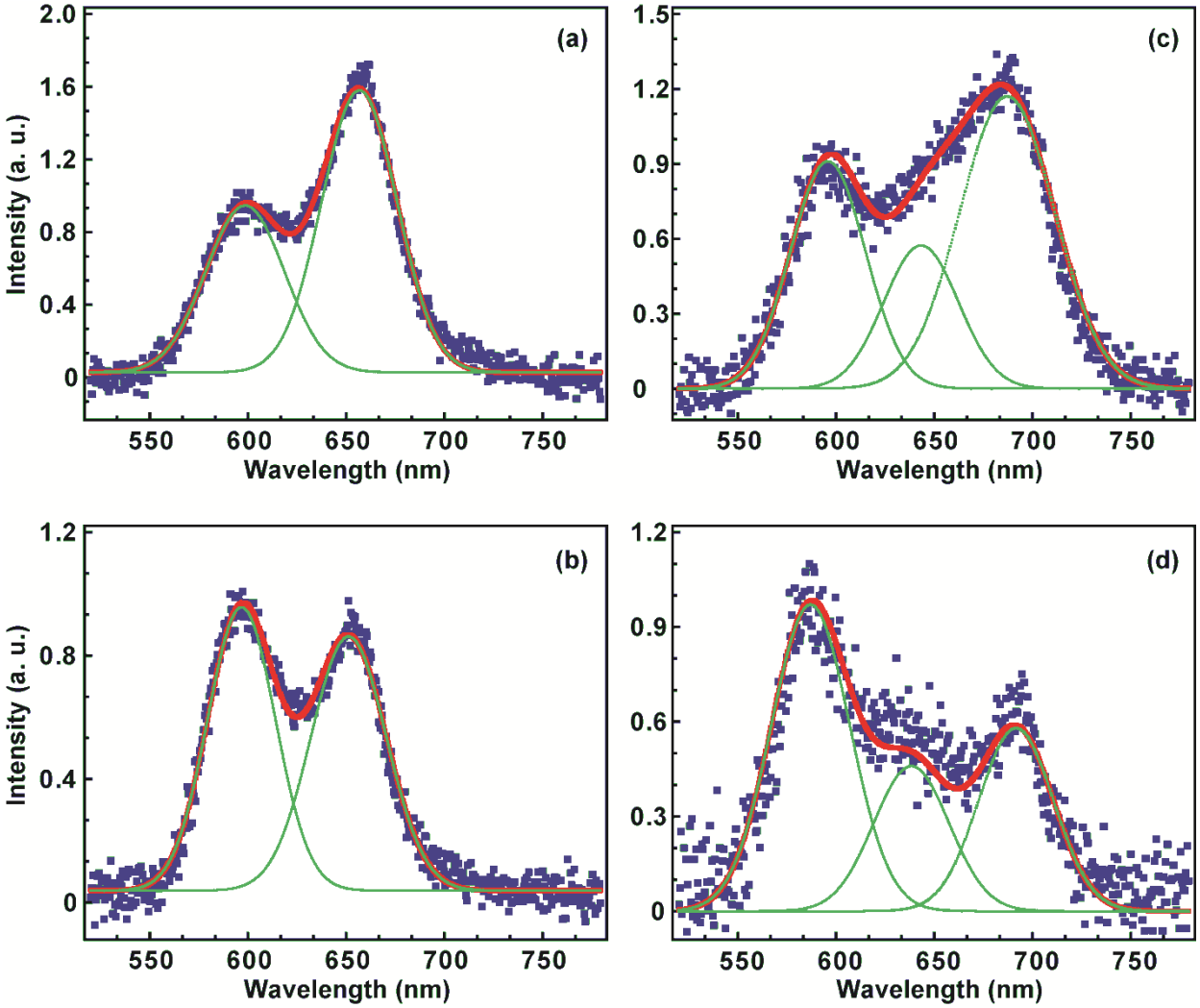

Fig. S2. (a, b) Fitting of each of the two emission spectra in Fig. 2f with two Gaussian peaks. (c, d) Fitting of each of the two emission spectra in Fig. 2h with three Gaussian peaks.

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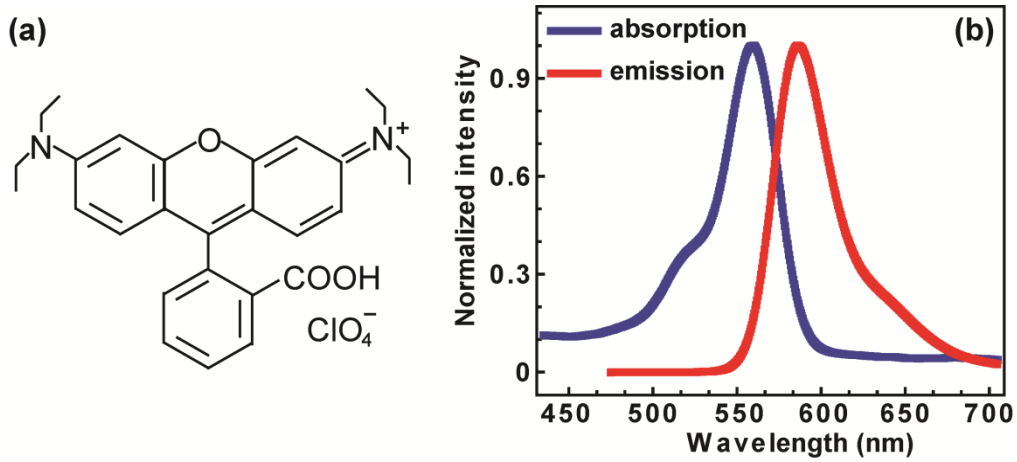

Fig. S3. (a) Molecular structure of R610. (b) Normalized absorption (blue curve) and emission (red curve) spectra of R610 molecules that are embedded in a mesostructured silica film.

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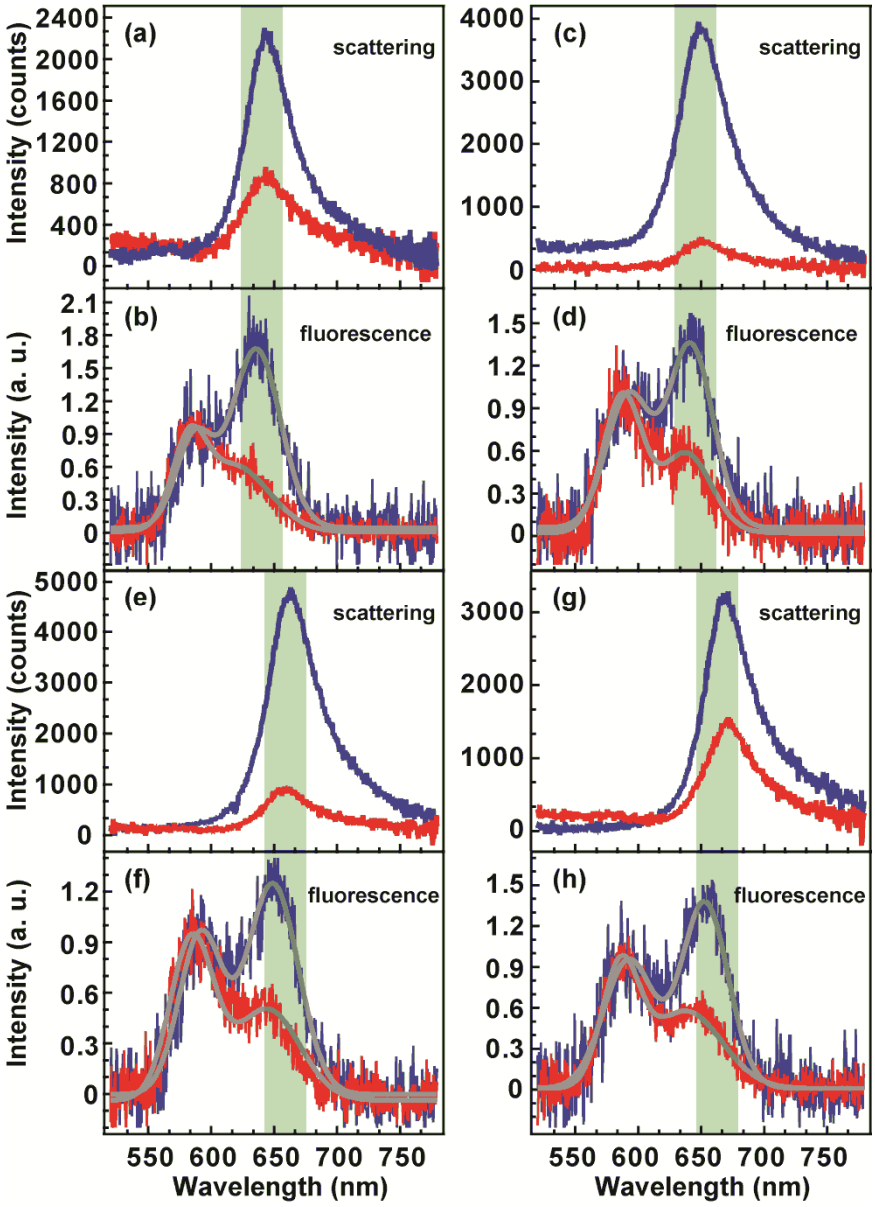

Fig. S4. Scattering and corresponding fluorescence spectra recorded from the big (blue curves) and small (red curves) R610-embedded hybrid nanostructures with the Au nanorod cores having different aspect ratios. The two scattering spectra in each of (a, c, e, g) exhibit almost the same plasmon resonance wavelength. They are chosen for the purpose of comparison. The LPRWs of the nanostructures for (a, c, e, g) are 645, 650, 660, and 670 nm, respectively. The corresponding fluorescence spectra of the same big (blue curves) and small (red curves) hybrid nanostructures are shown in (b, d, f, h), respectively. The fluorescence spectra have been normalized against the

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respective intrinsic peak intensity values. The large noise is due to the weak fluorescence signal. The vertical green bars mark the scattering peak wavelengths. The grey curves are guides for eyes.

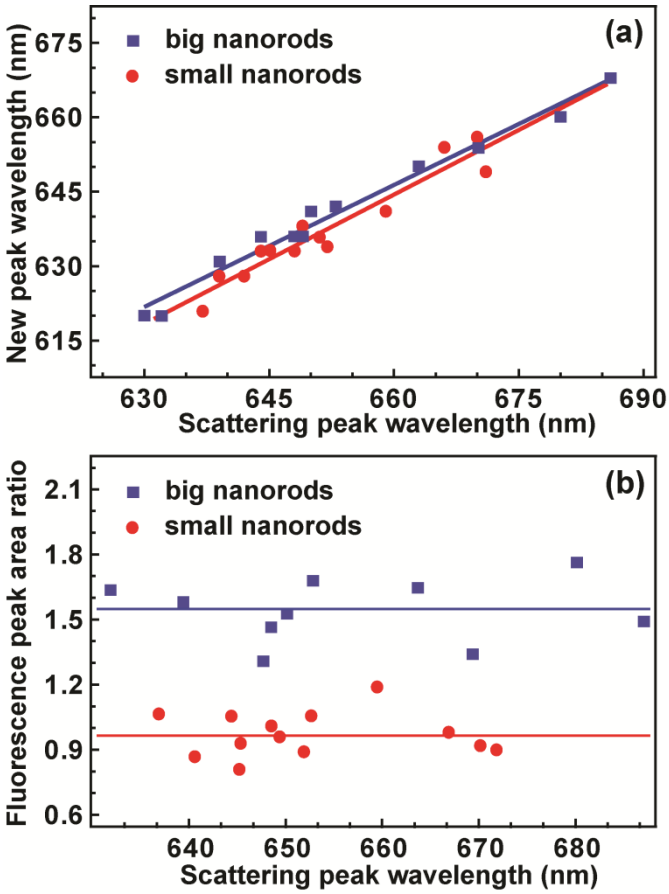

Fig. S5. (a) Correlations between the wavelengths of the new emission peaks on the fluorescence spectra and the LPRWs obtained from the scattering spectra for the R610-embedded hybrid nanostructures. The blue and red lines are linear fittings of the data acquired from the big (blue squares) and small (red circles) hybrid nanostructures, with the slopes being 0.82 and 0.87 and the coefficients of determination being 0.990 and 0.958, respectively. (b) Plots of the integral intensity ratio of the new emission peak to the corresponding intrinsic emission one as a function of the LPRW for the big (blue

squares) and small (red circles) hybrid nanostructures. The average intensity ratios are 1.6 ± 0.3 and 1.0 ± 0.1, respectively.

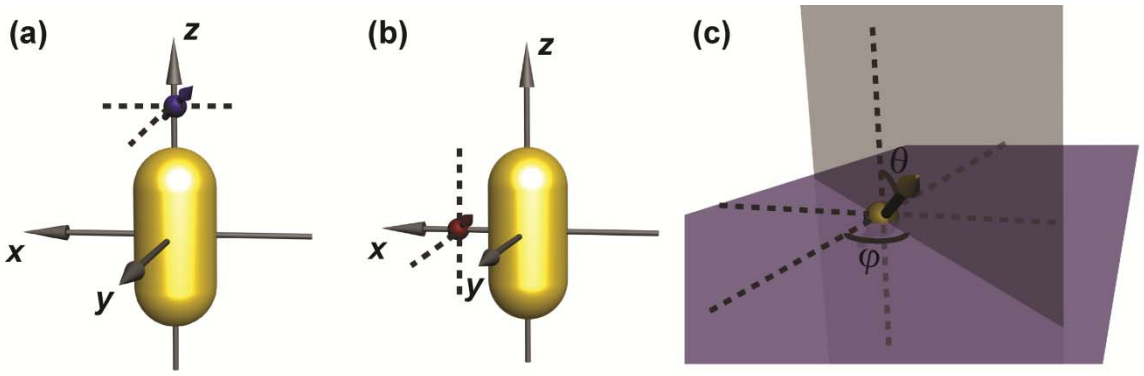

Fig. S6. Schematic showing the location and orientation of the dipole source relative to the nanorod. (a) The dipole is located at one end of the nanorod. (b) The dipole is located at the side and half length of the nanorod. (c) Orientation of the dipole. θ and φ are the inclination and azimuth angle, respectively.

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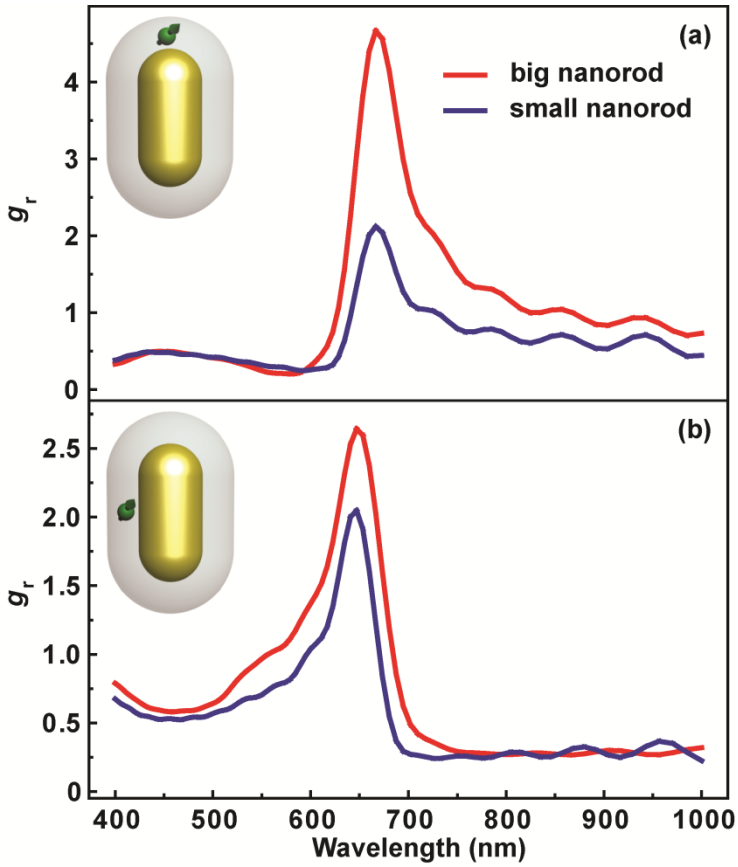

Fig. S7. Calculated enhancement factors of the radiative decay rates for the big (red curves) and small (blue curves) hybrid nanostructures. (a) The dipole source is located at one end of the nanorod. (b) The dipole source is located at the side and half length of the nanorod.

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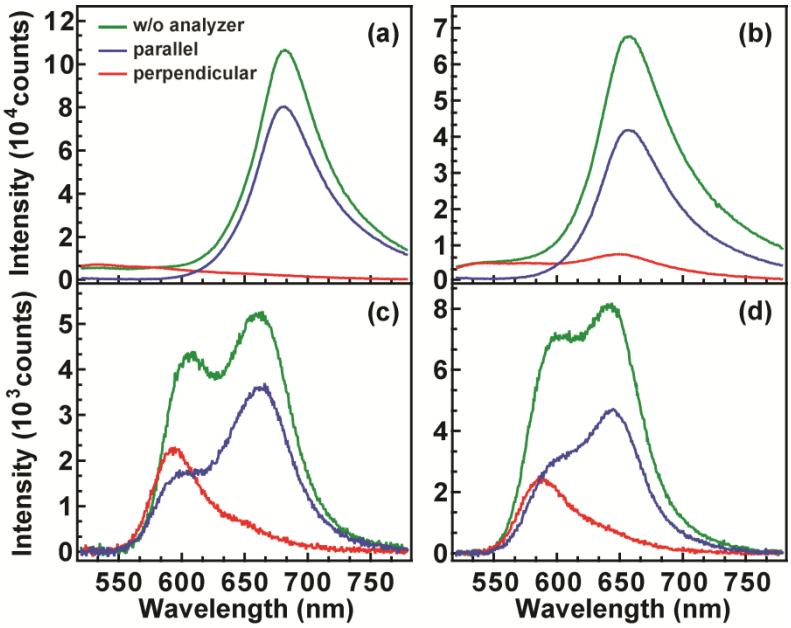

Fig. S8. Polarization-dependent scattering and fluorescence spectra. (a, b) Scattering spectra recorded on two big hybrid nanostructures. The green, blue, and red curves are the scattering spectra taken in the absence of a polarization analyzer, in the presence of a polarization analyzer with its polarization axis aligned parallel and perpendicular to the nanorod length axis, respectively. The LPRWs of the two nanostructures are 682 nm and 657 nm, respectively. (c, d) Corresponding fluorescence spectra acquired from the same two nanostructures as in (a, b), respectively, under the same configurations of the polarization analyzer.