Electronic Supplementary Information (ESI)

Use of fluorescence signals generated by elastic scattering under monochromatic incident light for determining the scattering efficiencies of various plasmonic nanoparticles

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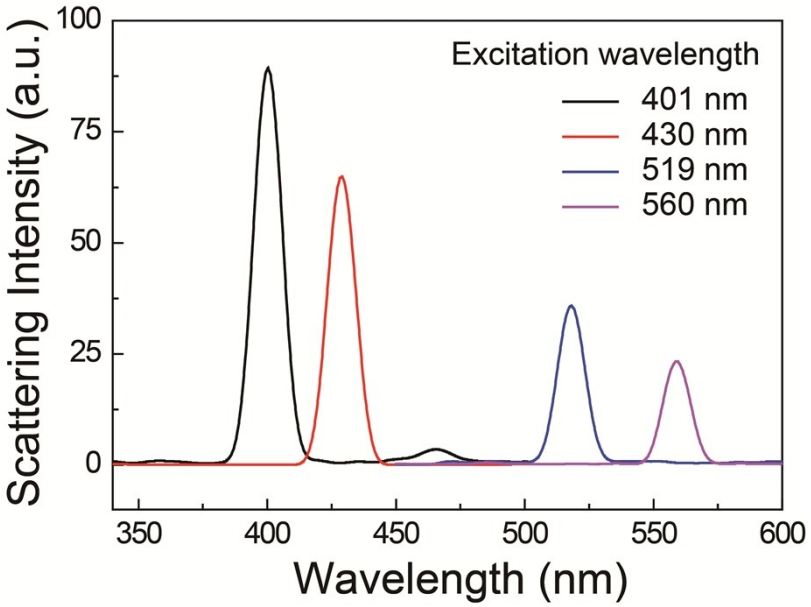

Fig. S1. FL emission spectra of deionized water at excitation wavelength of 401, 430, 519 and 560 nm. The scattering intensities due to Rayleigh scattering from water are negligible when compared with those of Au and Ag NPs.

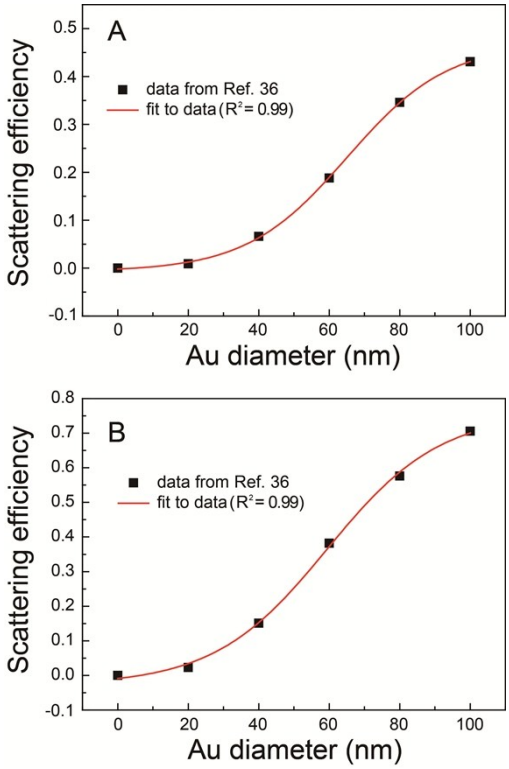

Fig. S2. Plots showing the theoretical scattering efficiencies at (A) 519 nm and (B) 560 nm calculated in Ref. 36 as a function of diameters of spherical Au nanoparticles. Red solid lines are the sigmoidal fits to each data set.

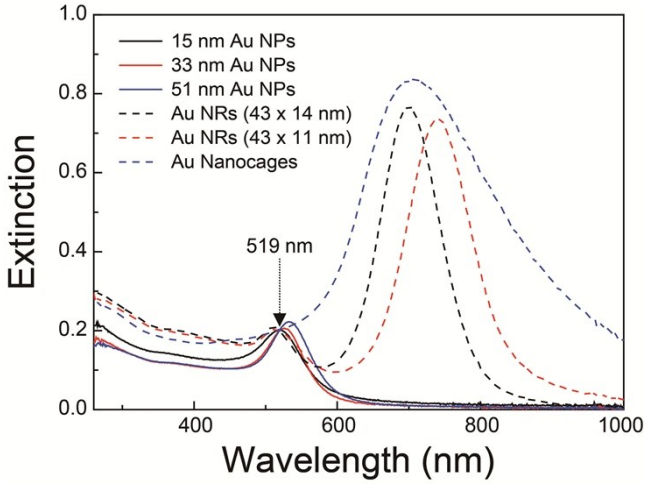

Fig. S3. Dashed lines: UV-visible extinction spectra of three non-spherical Au nanoparticles. Solid lines: UV-visible extinction spectra of 15, 33, and 51 nm spherical Au nanoparticles are also included for comparison. Extinction values of all particles were adjusted to 0.2 at 519 nm.

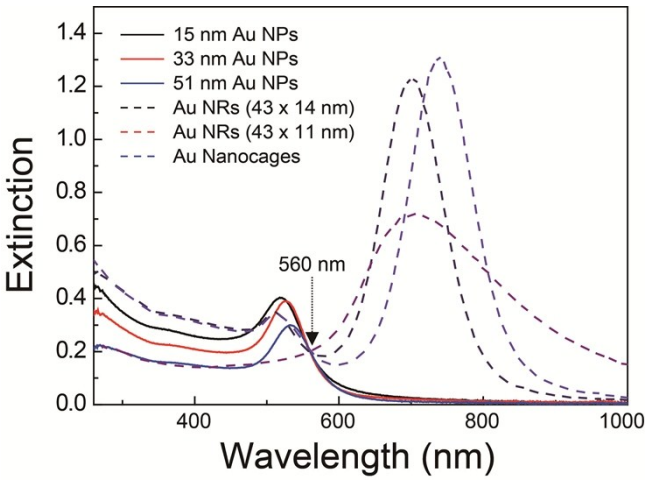

Fig. S4. Dashed lines: UV-visible extinction spectra of three non-spherical Au nanoparticles. Solid lines: UV-visible extinction spectra of 15, 33, and 51 nm spherical Au nanoparticles are also included for comparison. Extinction values of all particles were adjusted to 0.2 at 560 nm.

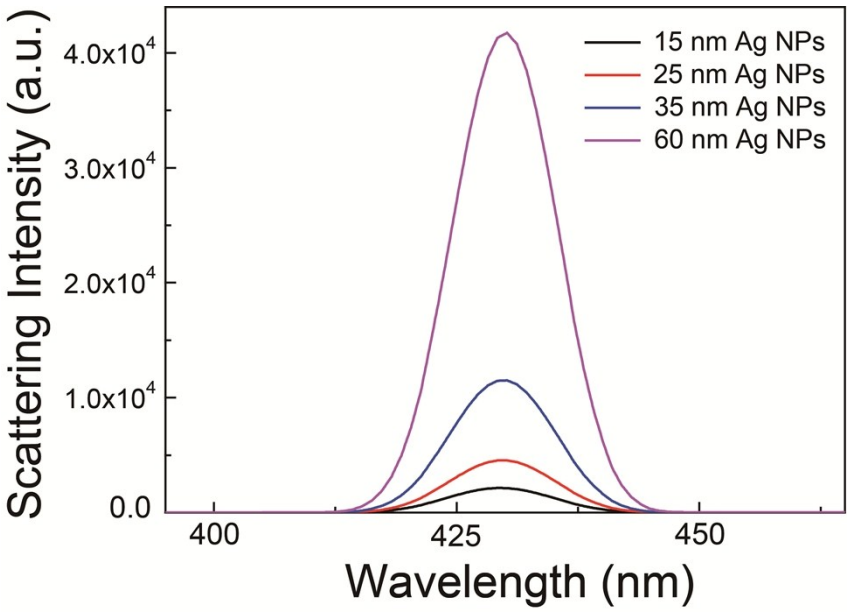

Fig. S5. FLemission spectra of four types of Ag spherical nanoparticles at excitation wavelength of 519 nm. UV-visible extinction values of the nanoparticles were adjusted to 0.05 at 519 nm.

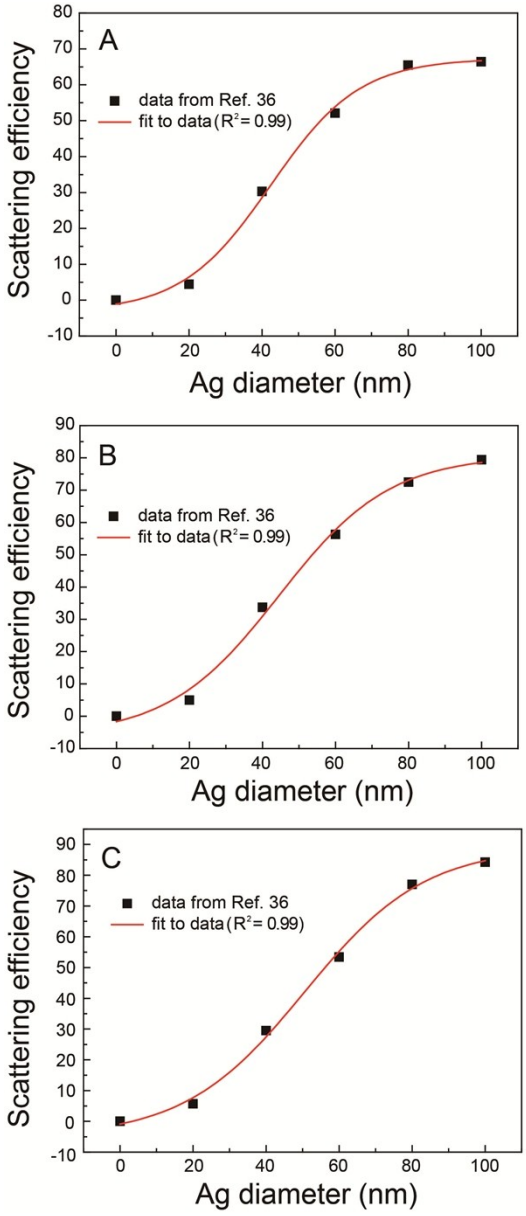

Fig. S6. Plots showing the theoretical scattering efficiencies at (A) 401 nm, (B) 430 nm and (C) 519 nm calculated in Ref. 36 as a function of diameters of spherical Ag nanoparticles. Red solid lines are the sigmoidal fits to each data set.

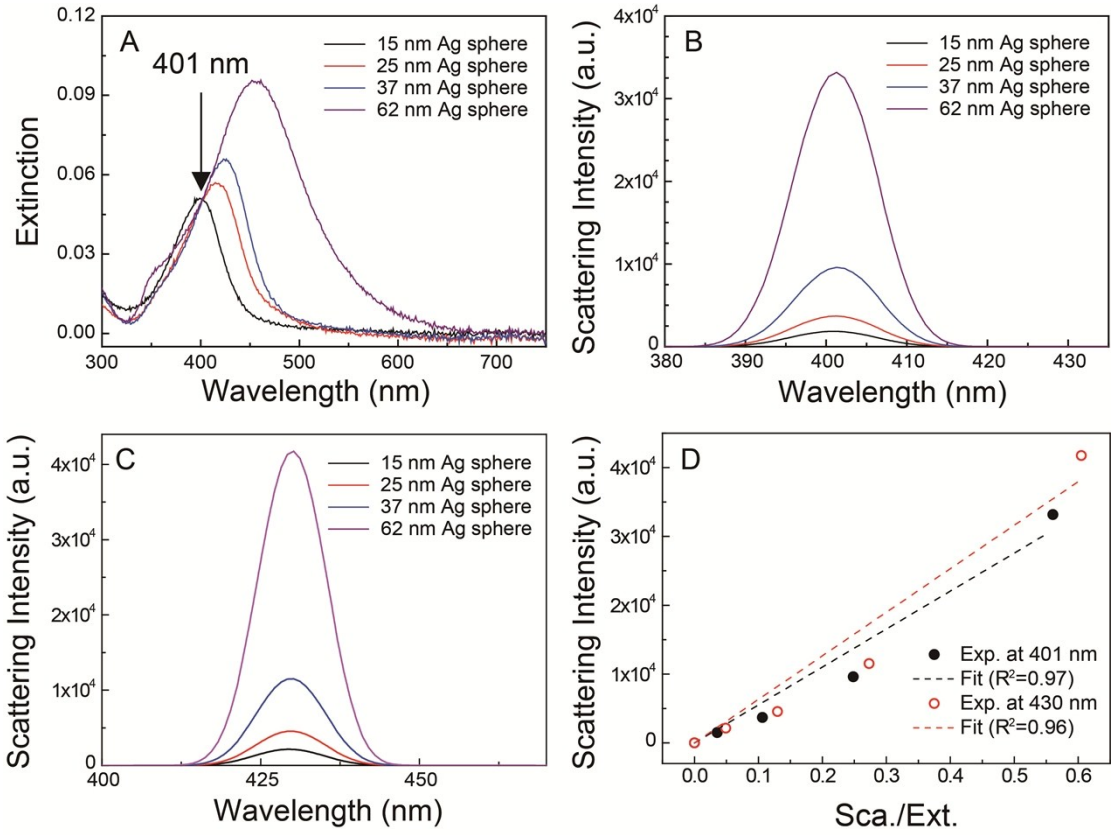

Fig. S7. (A) UV-vis extinction spectra of four types of spherical Ag nanoparticles. Extinction values of the particles were adjusted to 0.05 at 401 nm. (B) FL emission spectra of four types of Ag nanoparticles at 401 nm (= excitation wavelength). (C) FL emission spectra of four types of Ag nanoparticles at excitation wavelength of 430 nm (= excitation wavelength). (D) Plots showing the scattering intensities of Ag nanoparticles experimentally determined as a function of their scattering efficiencies (ratios of scattering to extinction cross-sections). Scattering efficiencies of the present Ag nanoparticles were obtained by fitting data from Ref. 36. Dashed lines are the linear fits to each data set.

Explanation for Fig. S7. The extinction ranges should be adjusted to 0.05 to avoid the saturation of scattering intensities due to large scattering efficiencies of Ag nanoparticles (Fig. S7A). Rayleigh scattering due to water was negligible at 401 (value: 89) and 430 nm (value: 65) when compared with the scattering intensity due to 15-nm Ag nanoparticles (1487 and 2145 at 401 and 403 nm, respectively). See Fig. S1. The FL emission spectra of four types of Ag nanoparticles at the excitation of 401 and 430 nm were compared in Fig. S7B and Fig.

S7C, respectively. Fig. S7D shows the plots of scattering intensities as a function of φ_{scat}. φ_{scat} of spherical Ag nanoparticles were obtained from a sigmoidal fitting the calculated values shown in Ref. 36, as shown in Fig. S6. Linear calibration curves were obtainable by fitting to the data: for 401 and 430 nm, the equations were $FL=55145*\varphi_{scat}$ ($R^2 = 0.97$) and $FL=63268*\varphi_{scat}$ ($R^2 = 0.96$), respectively.