Supplementary Material for Nanoscale

Supporting Information

for

Influence of Surface Plasmon Resonance on the Emission Intermittency of Photoluminescence from Gold Nano-sea-urchins

by

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1. Time resolved photoluminescence of Au nanoparticles (Au NPs) and Au sea-urchin-shaped nanoparticles (Au NSUs).

Fig.S1 presents the time resolved photoluminescence. There are two decay channels for gold nanoparticles and nano-sea-urchins. The decay time constant for first channel (fast channel) ranges from 250 ps to 500 ps. However, the time resolution of the system is about several hundred pico-seconds. The behavior of the first channel cannot be resolved by our system. The decay time constant of the second channel which is the slower and dominating channel are 3.117 ns, 2.955 ns, 2.662 ns, and 2.545 ns for 11 nm Au NPs, 25 nm Au NSUs, 58 nm Au NSUs, and 84 nm Au NSUs, respectively. The decay time constant decreases, as the size of Au NSUs increases. This indicates stronger photoluminescence for larger Au NSU.

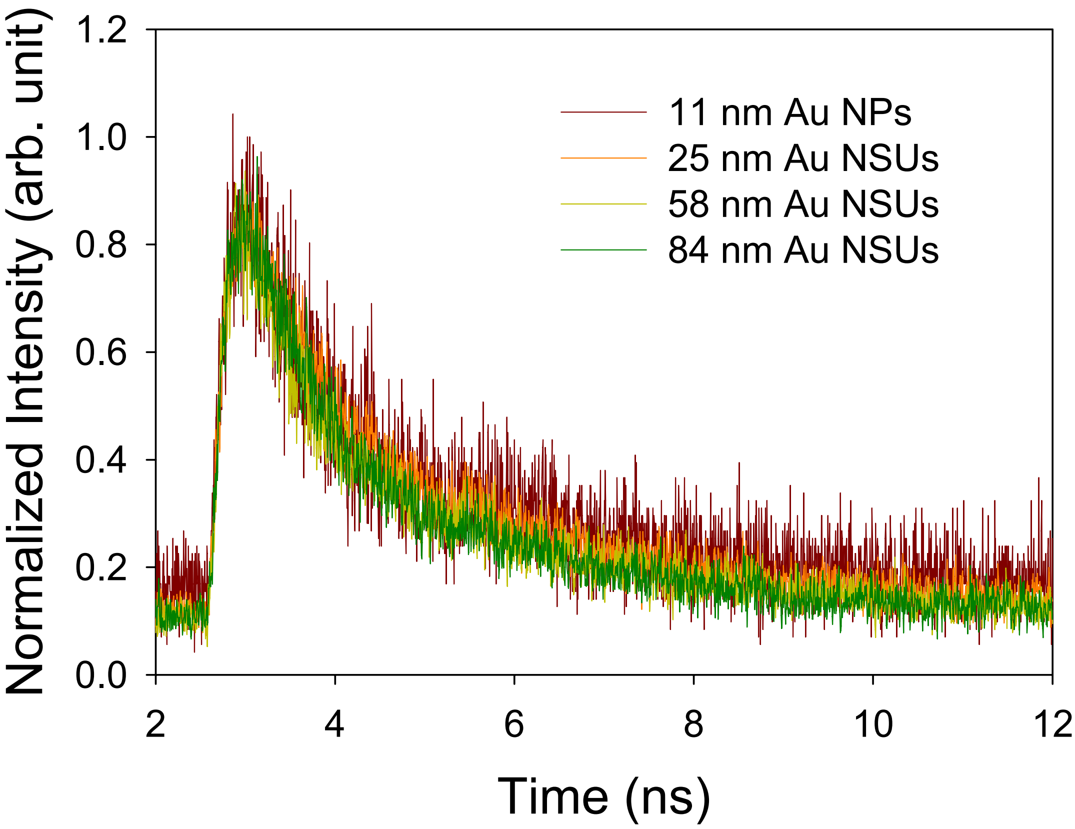


Fig. S1 Time resolved photoluminescence of Au nanoparticles (Au NPs) and Au sea-urchin-shaped nanoparticles (Au NSUs).

2. Size distribution of Au nanoparticles (Au NPs) and Au sea-urchin-shaped nanoparticles (Au NSUs) obtained with a zetasizer.

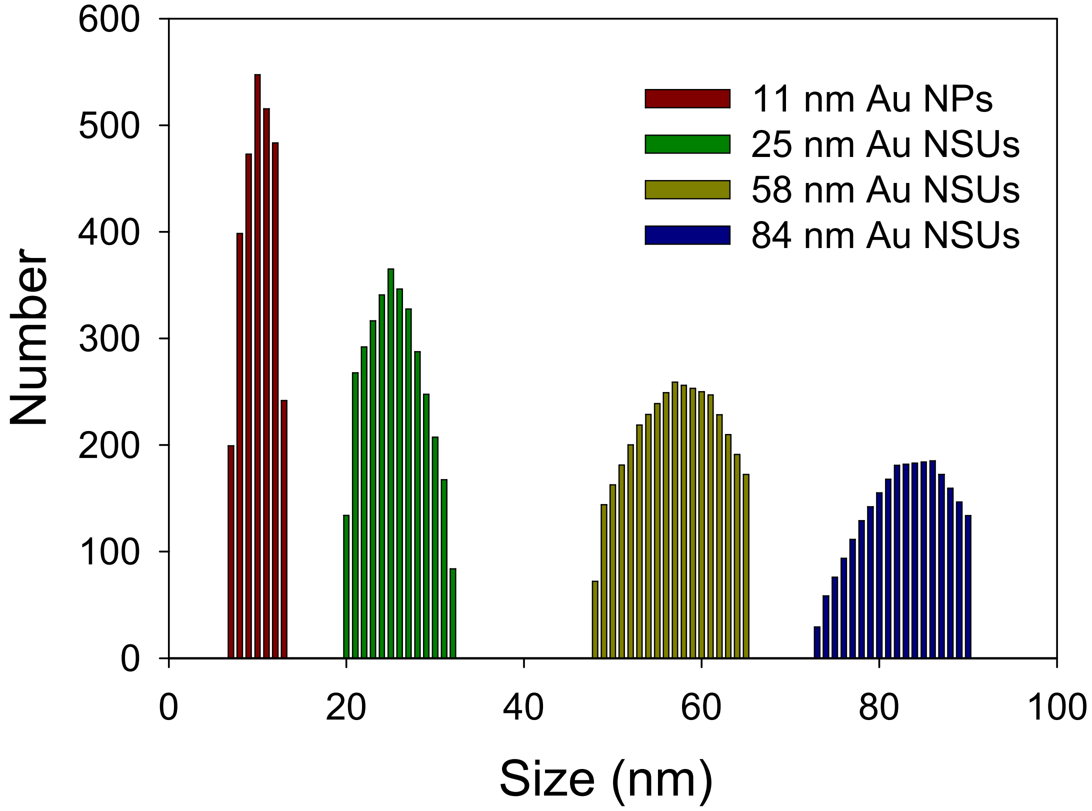
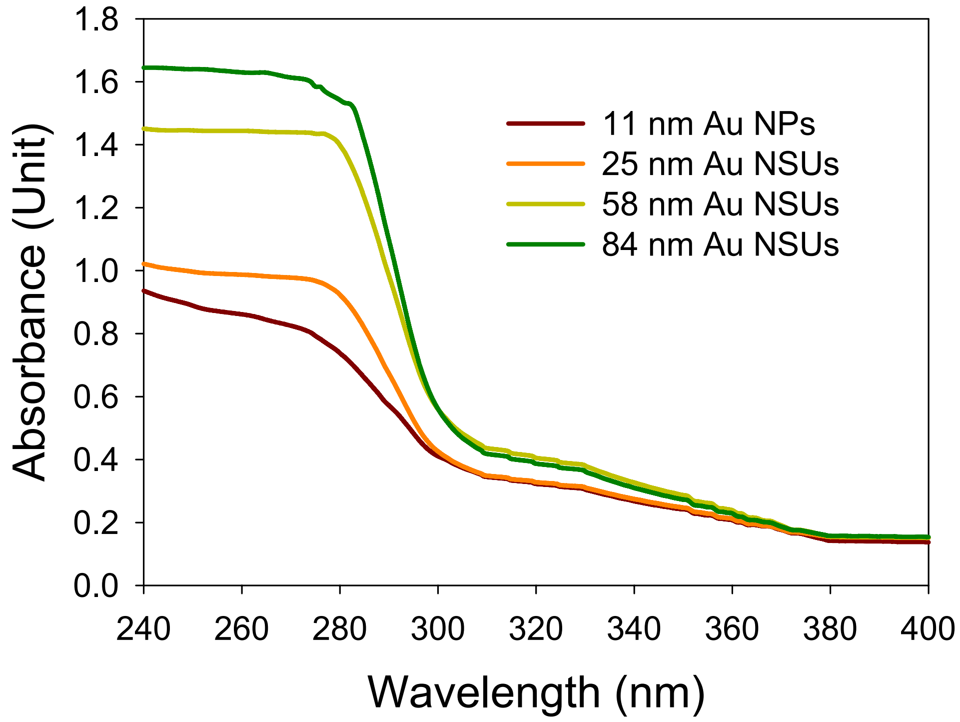
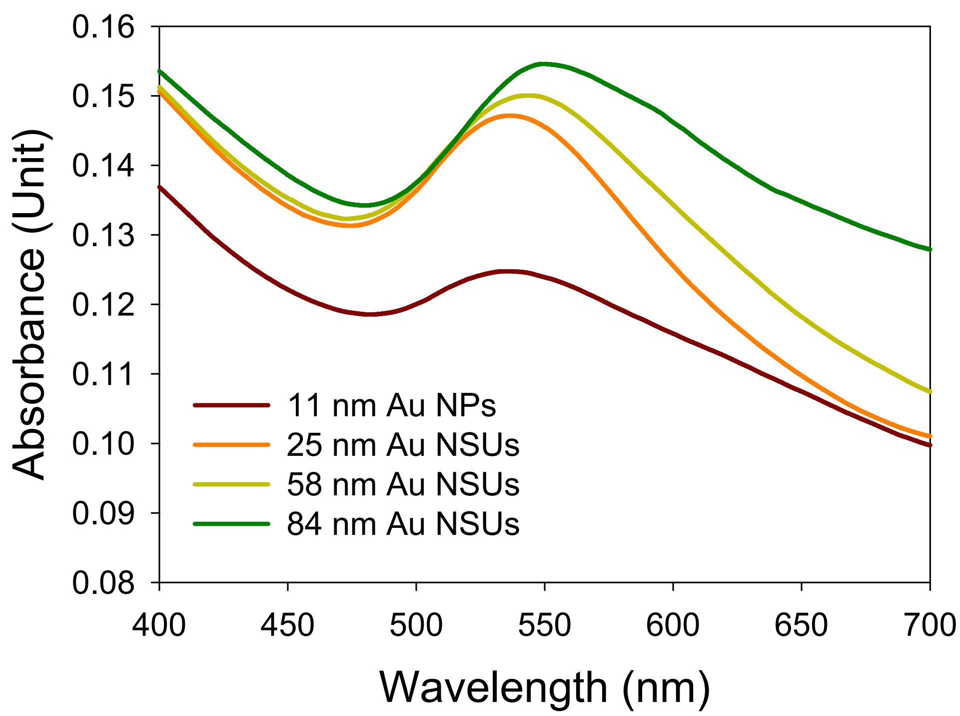


Fig. S2 Size distribution of Au nanoparticles (Au NPs) and Au sea-urchin-shaped nanoparticles (Au NSUs) obtained with a zetasizer. The average size of the Au nanoparticle (Au NP) and Au sea-urchin-shaped nanoparticles are 11, 25, 58, 84 nm, respectively.

3. Absorption spectrum for Au NPs and Au NSUs



(a)



(b)

Fig. S3 Absorption spectrum for Au NPs and Au NSUs in (a) ultra-violet light and (b) visible light regime.

4. Normalized on-state probability distribution

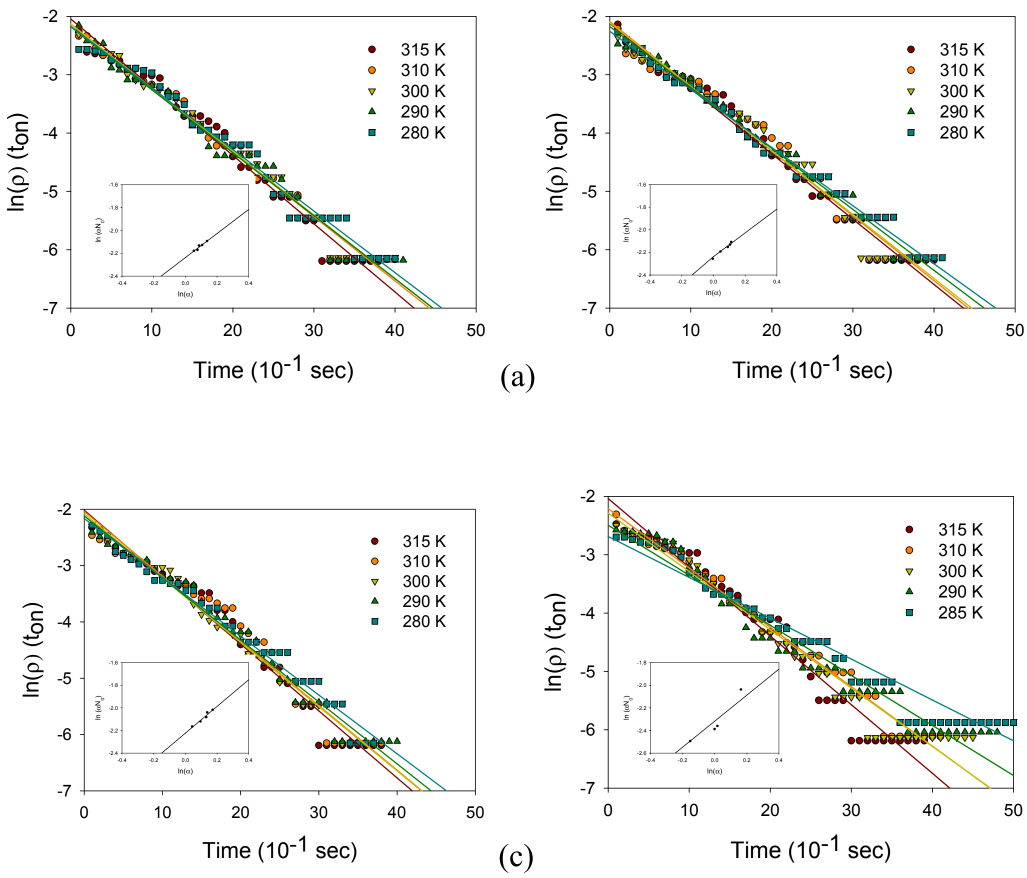


Fig. S4 Normalized on-state probability distribution of (a) 11 nm Au NPs, (b) 25 nm Au NSUs, (c) 58 nm Au NSUs, and (d) 84 nm Au NSUs. The insert is the relation between natural log slopes ($\ln\alpha$) and the intercept ($\ln\alpha N_0$) for the postulated first-order reaction model. Relation coefficients are 0.959, 0.990, 0.969, and 0.916, respectively.

5. Normalized off-state probability distribution

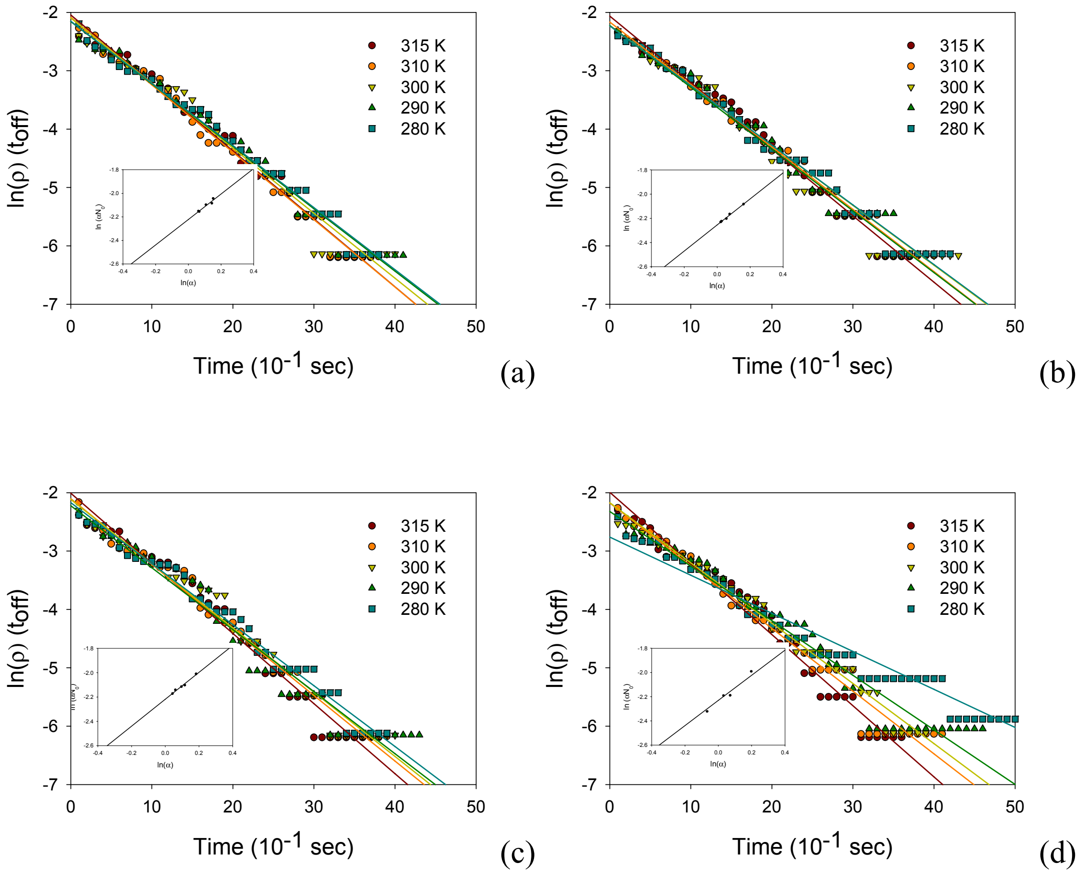
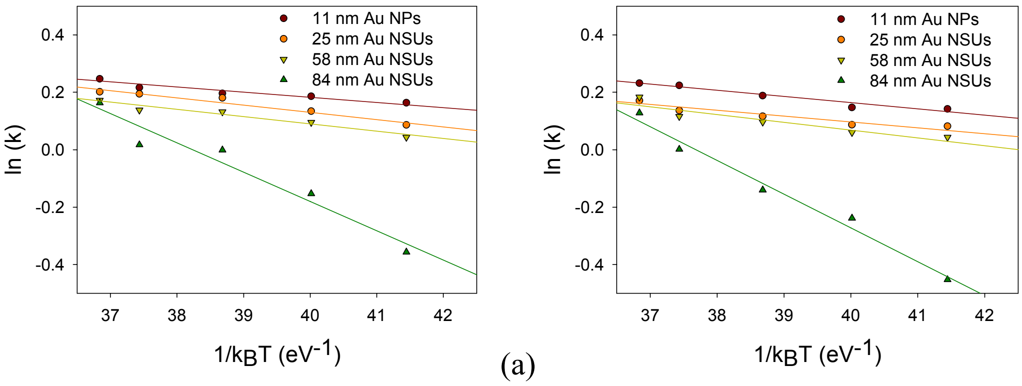


Fig. S5 Normalized off-state probability distribution of (a) 11 nm Au NPs, (b) 25 nm Au NSUs, (c) 58 nm Au NSUs, and (d) 84 nm Au NSUs. The insert is the relation between natural log slopes (ln α) and the intercept (ln α N_0) for the postulated first-order reaction model. Relation coefficients are 0.964, 0.995, 0.990, and 0.994, respectively.

6. Rate constants of 11 nm Au NPs, 25 nm Au NSUs, 58 nm Au NSUs, and 84 nm Au NSUs at different temperatures



(a) (b)

Fig. S6 Rate constants of 11 nm Au NPs, 25 nm Au NSUs, 58 nm Au NSUs, and 84 nm Au NSUs at different temperatures, 280 K, 290 K, 300 K, 310 K, and 315 K, for the (a) on process and (b) off process.