Supplemental Document

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Interference-based wide-range dynamic tuning of the plasmonic color of single gold nanoparticles: supplement

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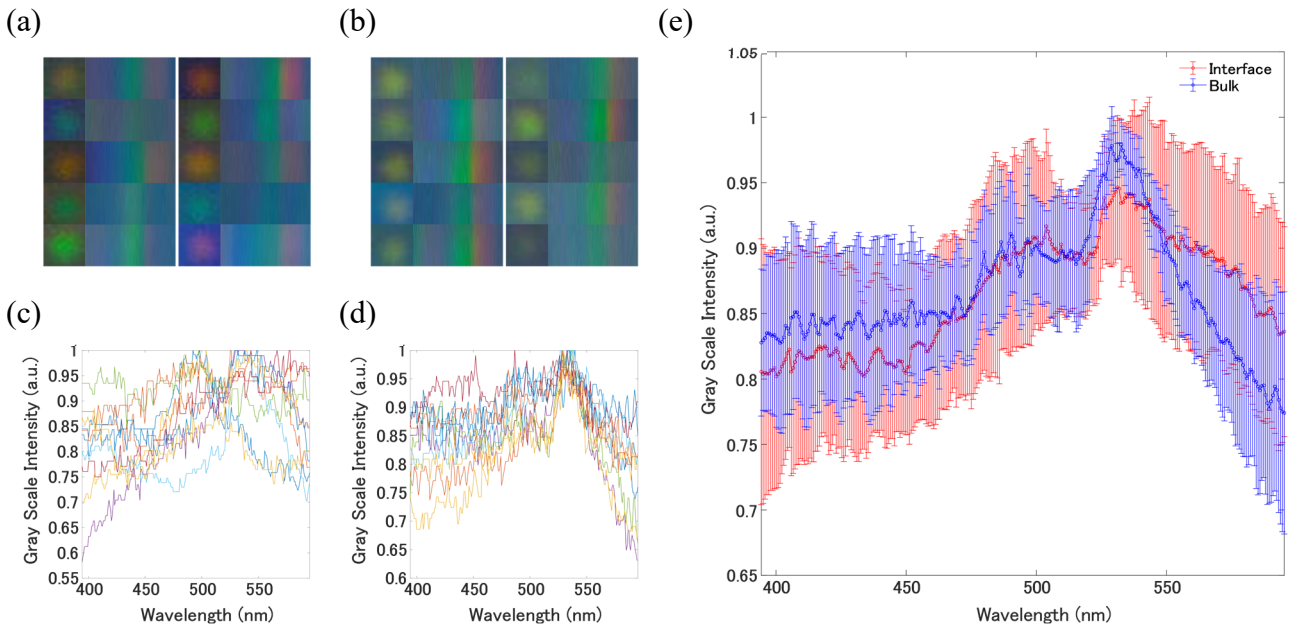

Fig. S1. (a, b) Images of the reflected light for several AuNPs (N = 10) with no diffraction (left) and after diffraction (right) (a) in the vicinity of interface and (b) in the bulk. (c, d) Gray scale spectra (c) in the vicinity of interface and (d) in the bulk. (e) Mean and standard deviation of spectral intensity calculated from (c) and (d).

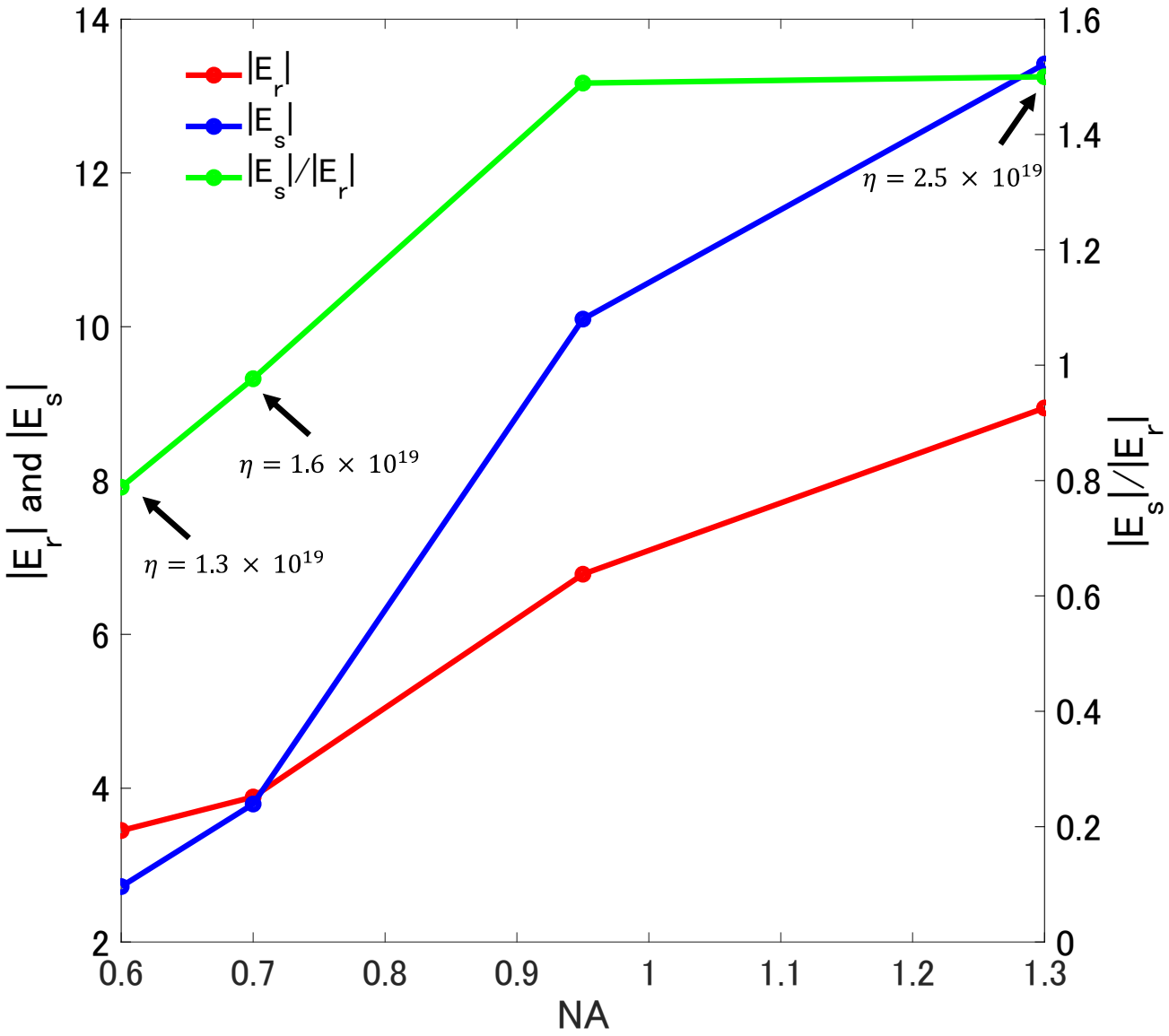

Fig. S2. Plots of field amplitude $|E_r|$, $|E_s|$, and $|E_s|/|E_r|$ deduced from experimentally measured intensity of the reflected light from the interface ($|E_r|^2$) and of the scattered light from an AuNP ($|E_s|^2$) for various diaphragm opening (NA). η is proportional to $|E_s|/|E_r|$.

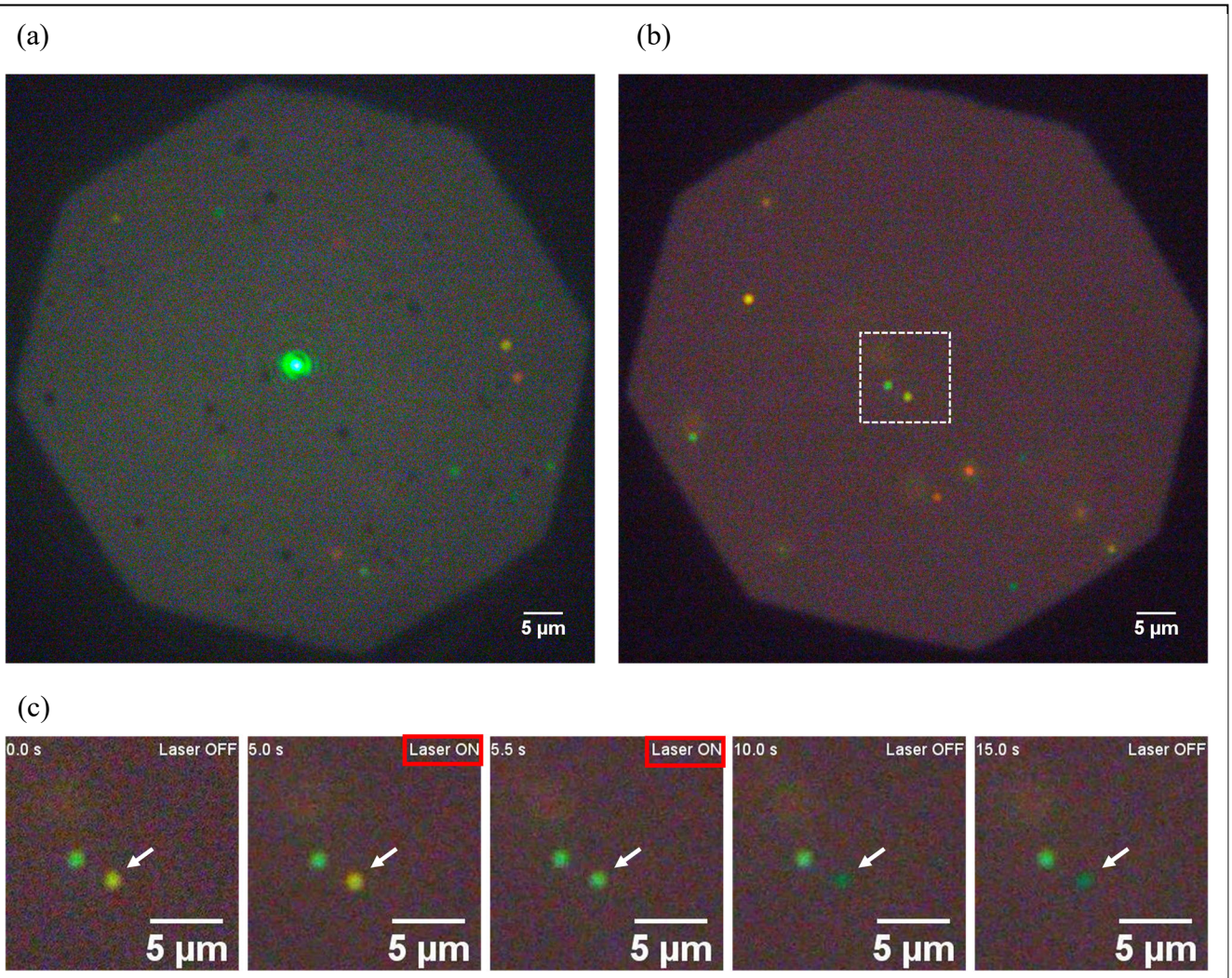

Fig. S3. (a) An image of pulsed-laser (λ=532 nm) spot. (b) A pair of neighboring AuNPs in a close distance (< 3 μm) in the spot. The reddish background is due to the use of notch filter to eliminate the green laser light. (c) Snapshots of the responses of the AuNPs to the laser heating., revealing the AuNP in lower right area (which is relatively close to the spot) changed its coloration during laser irradiation, however, another did not show any changes. The AuNP indicated by the arrow, which is a target for the local laser heating, changed its coloration during laser irradiation, while the other AuNP did not show any change. Owing to the low thermal conductivity of water, the heat generated by the AuNP did not affect the neighboring AuNPs, and thus enabled the local coloration tuning. It should be mentioned that the coloration change was not reversible. We suspect that the local heating causes degradation of polymer.

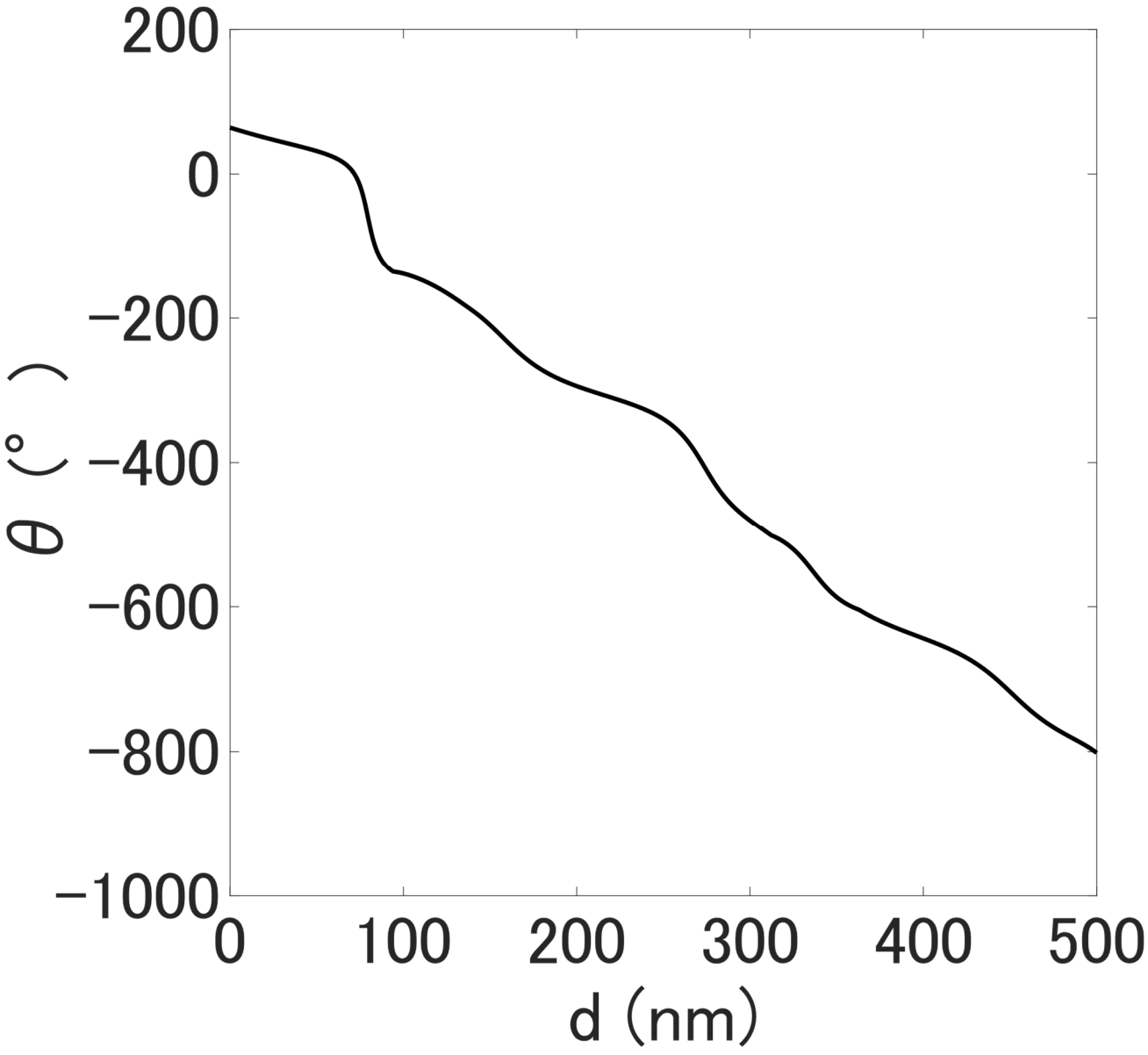

Fig. S4. *θ*-*d* profile obtained by theoretical calculation changing *d* from 0 to 500 nm.

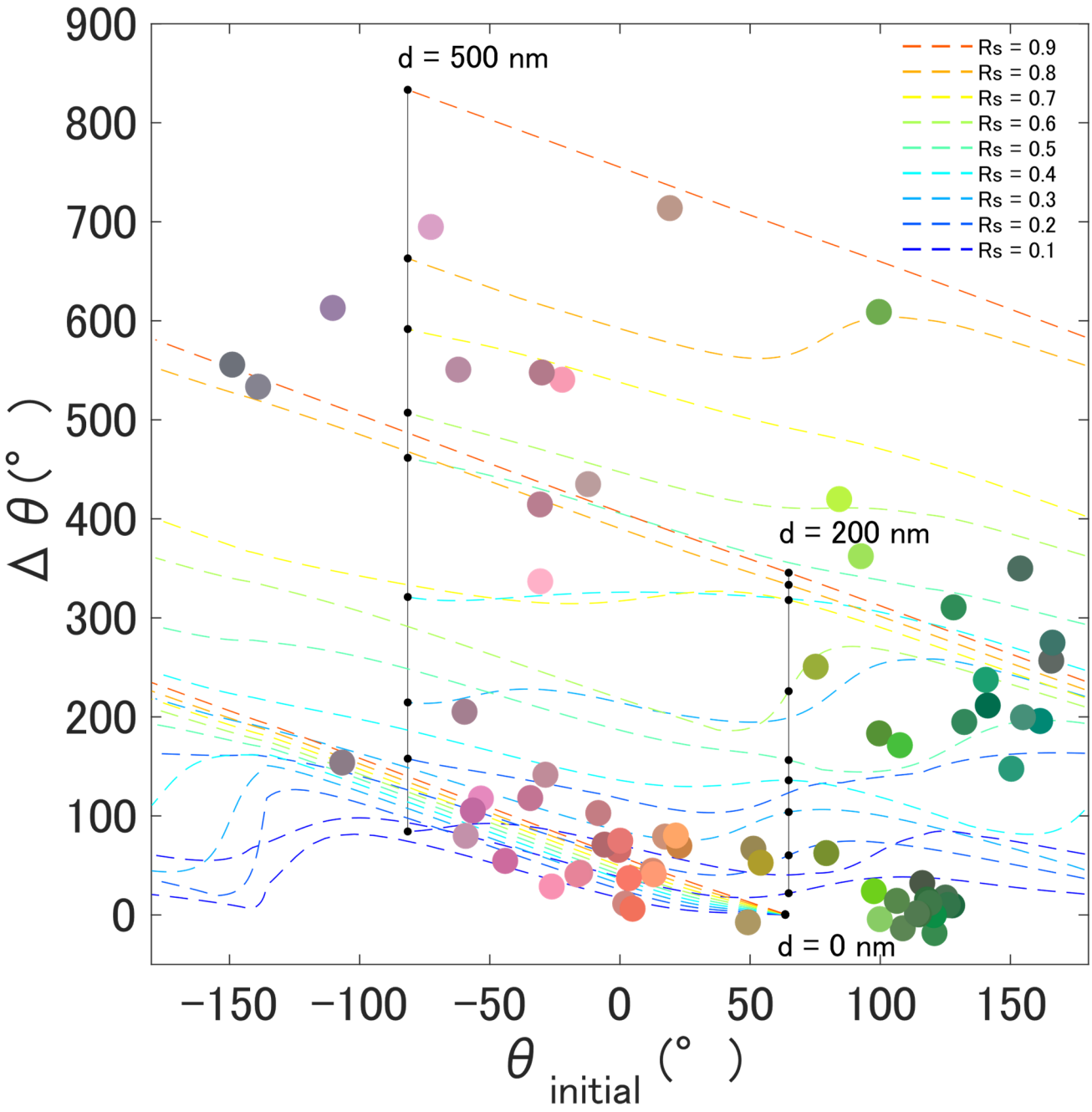

Fig. S5. The relationship between $\theta_{initial}$ and $\Delta\theta$ changing d from 0 nm to 500 nm, obtained by the theoretical calculation. The dash lines represent theoretical relationship between $\theta_{initial}$ and $\Delta\theta$ obtained by varying R_s from 0.1 to 0.9. The scattering of experimental results reflects the variation of R_s from particle to particle.