

Electronic Supplementary Information

Accelerated site-selective photooxidation on Au nanoparticles via electrochemically-assisted plasmonic hole ejection

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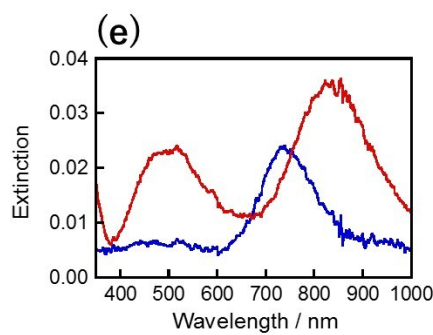
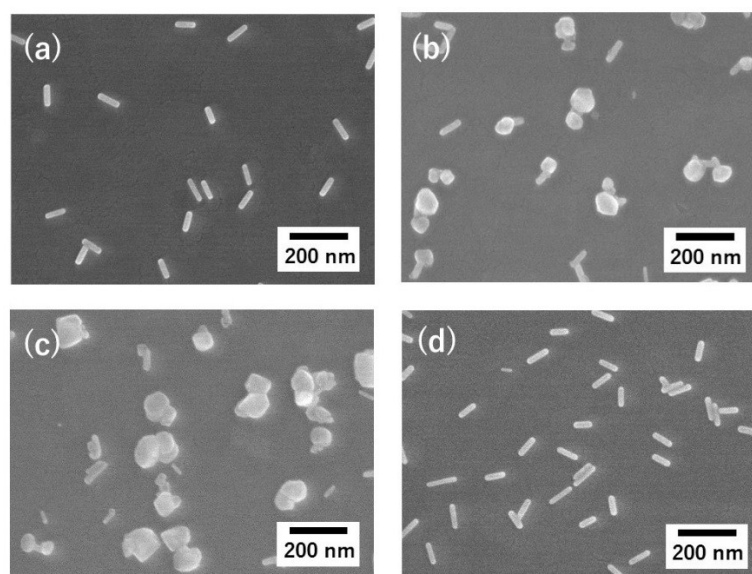


Fig. S1 Low magnification SEM images of AuNRs on ITO electrodes (a) before light exposure and (b, c) after longitudinal mode excitation for (b) 500 s and (c) 1000 s at +0.95 V in the presence of Pb^{2+} ions. (d) Non-irradiated region for the sample irradiated for 1000 s. (e) Extinction spectrum in air of AuNRs on an ITO electrode before (blue curve) and after (red curve) longitudinal mode excitation for 500 s at +0.95 V in the presence of Pb^{2+} ions.

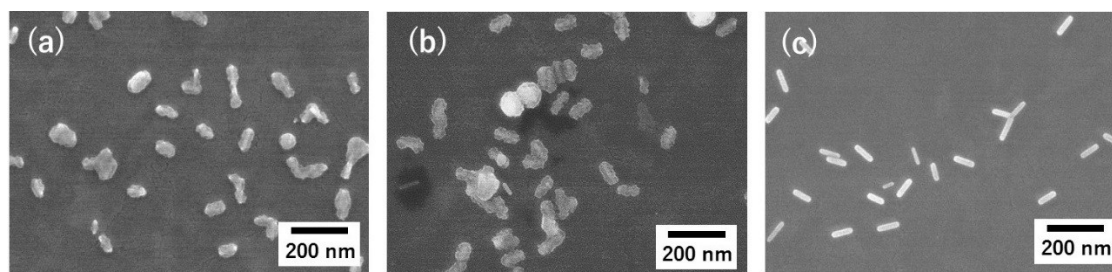


Fig. S2 Low magnification SEM images of AuNRs on ITO electrodes after transverse mode excitation for (a) 500 s and (b) 1000 s at +0.95 V in the presence of Pb^{2+} ions. (c) Non-irradiated region for the sample irradiated for 1000 s.

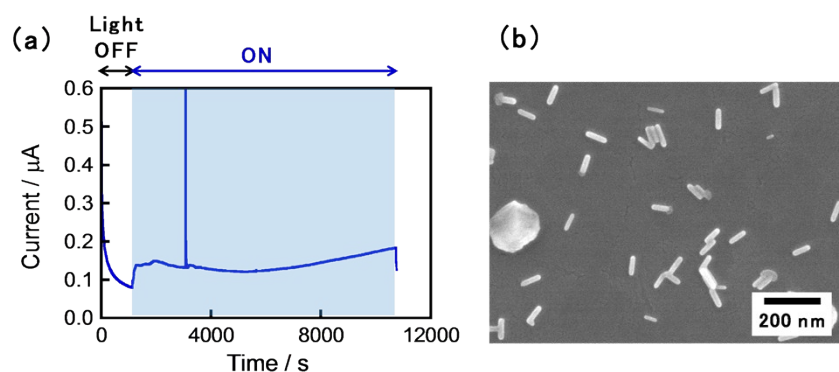


Fig. S3. (a) Time course of the current for the reaction conditions shown in Fig. 1b at +0.90 V. Irradiation time was $\sim 10\,000$ s. Shaded area represents light irradiation period. (b) Low magnification SEM image of AuNRs on an ITO electrode after longitudinal mode excitation for $\sim 10\,000$ s at +0.90 V in the presence of Pb^{2+} ions.

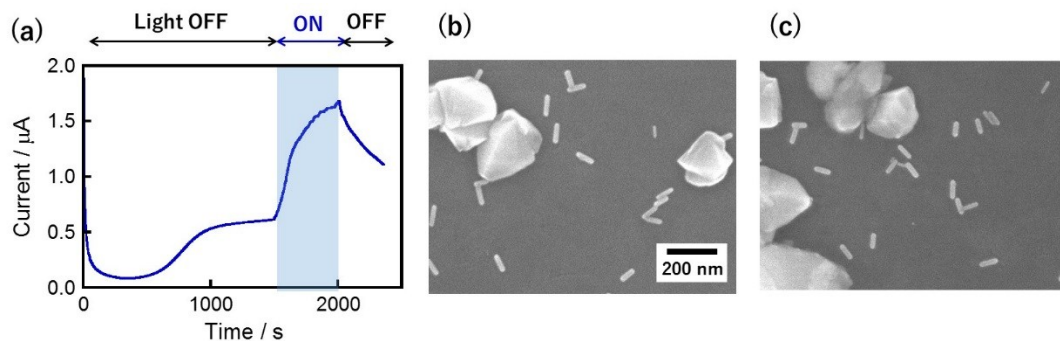


Fig. S4. (a) Time course of the current for the reaction conditions shown in Fig. 1b at +1.00 V. Irradiation time was ~ 500 s. Shaded area represents light irradiation period. (b) Low magnification SEM image of AuNRs on an ITO electrode after longitudinal mode excitation for ~ 500 s at +1.00 V in the presence of Pb^{2+} ions. (c) Non-irradiated region for the irradiated sample.

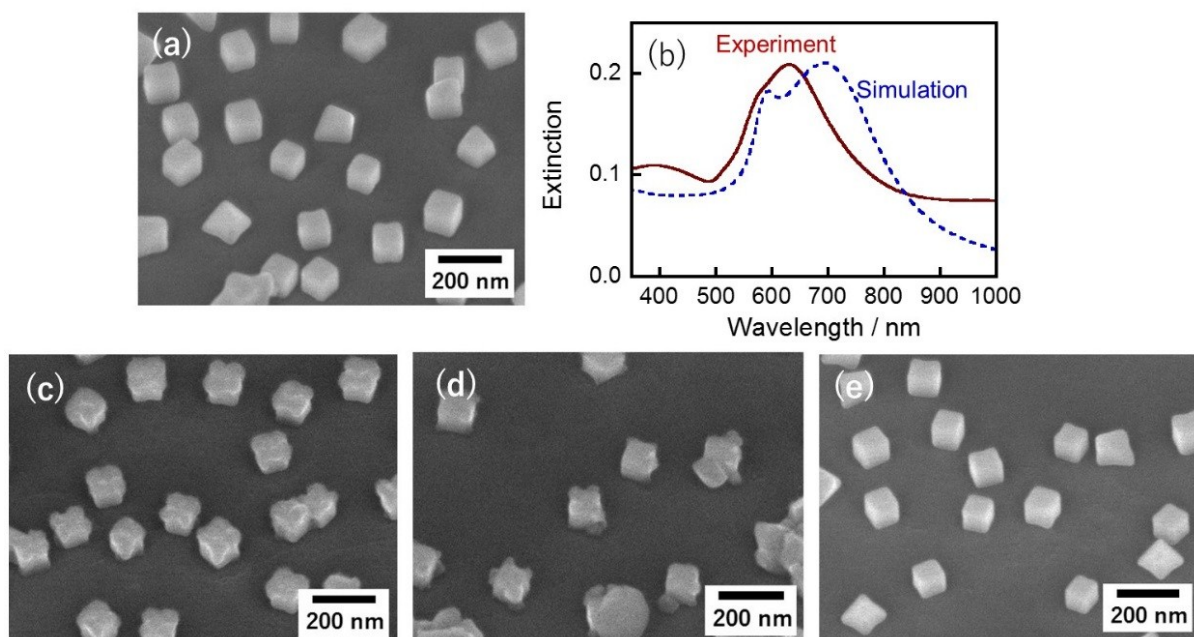


Fig. S5. Low magnification SEM images of AuNCs on ITO electrodes (a) before light exposure and (c, d) after (c) distal mode excitation for ~1000 s and (d) proximal-distal mode excitation for ~2000 s at +0.95 V in the presence of Pb^{2+} ions. (b) Experimentally obtained (red curve) and simulated (blue dashed curve) extinction spectra in water of AuNC(s) on an ITO electrode before light exposure. (e) SEM image of a non-irradiated region for the proximal-distal mode excitation.

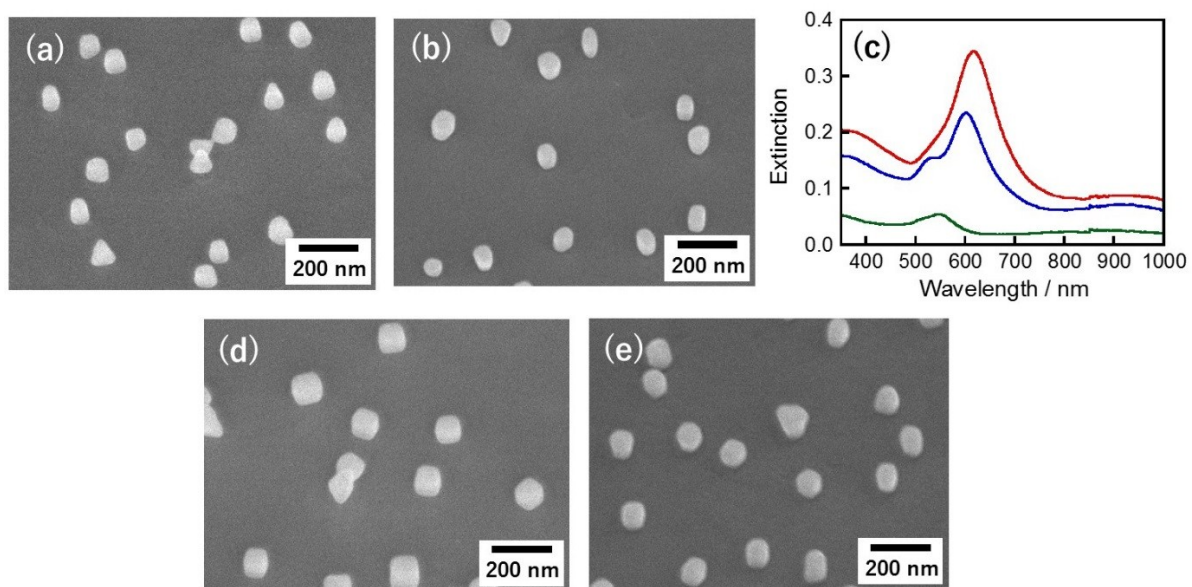


Fig. S6 (a, b) Low magnification SEM images of AuNCs on ITO electrodes after (a) distal mode excitation for $\sim 10\,000$ s and (b) proximal-distal mode excitation for $\sim 14\,000$ s at $+0.85$ V in the presence of Cl^- ions. (d, e) Non-irradiated regions for the (d) distal mode and (e) proximal-distal mode excitation. (c) Extinction spectra in air of AuNCs on an ITO electrode before (blue curve) and after site-selective PbO_2 deposition (red curve) and after etching (green curve) upon excitation of distal mode.