Photoreductive synthesis of monodispersed Au nanoparticles with citric acid as reductant and surface stabilizing reagent

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Electronic Supplementary Information (ESI†)

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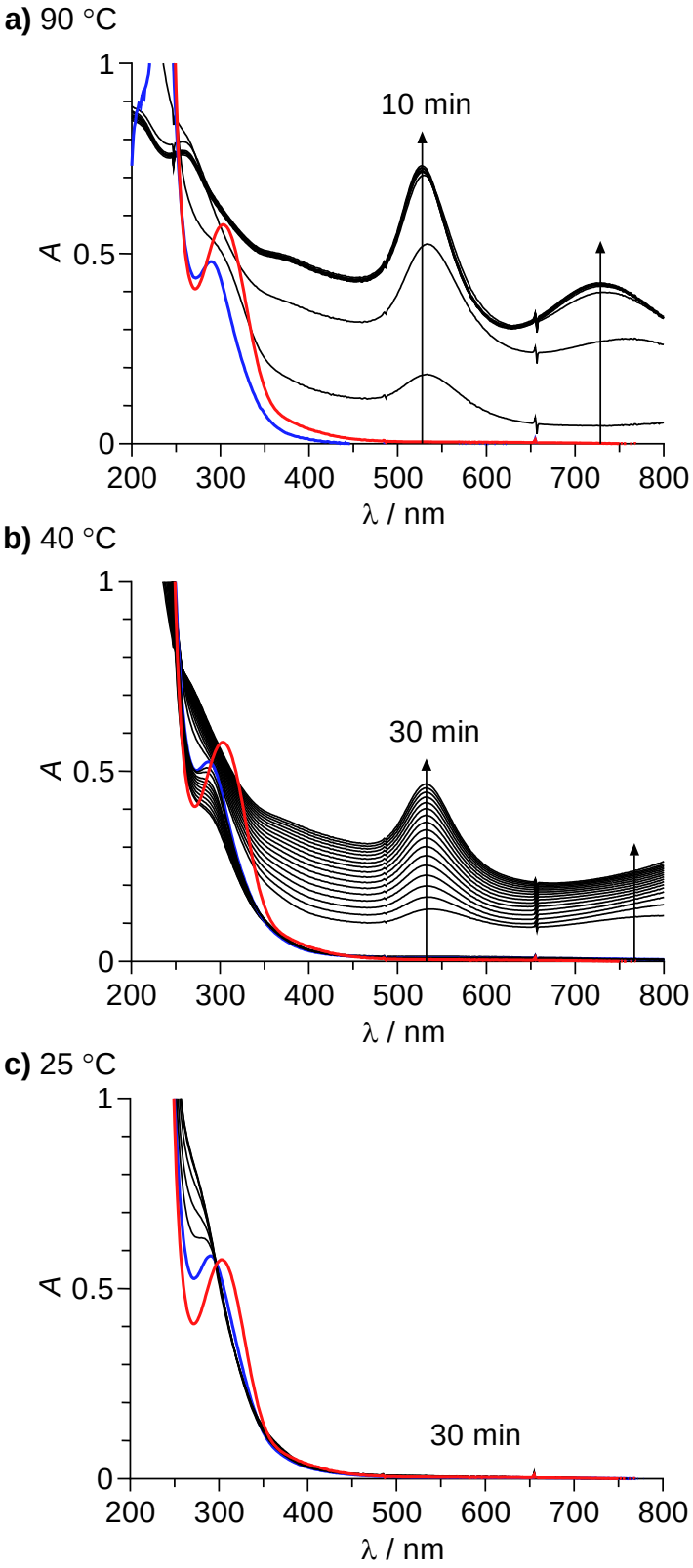

Fig. S1 Time-dependent change in absorption spectra of water containing $HAuCl_4 \cdot 4H_2O$ (0.2 mM) and citric acid (0.5 mM) during stirring at (a) 90 °C, (b) 40 °C and (c) 25 °C in the dark. The red is the spectrum for the solution containing $HAuCl_4 \cdot 4H_2O$ at 25 °C, and the blue is the spectrum for the solution after addition of citric acid (1 min).

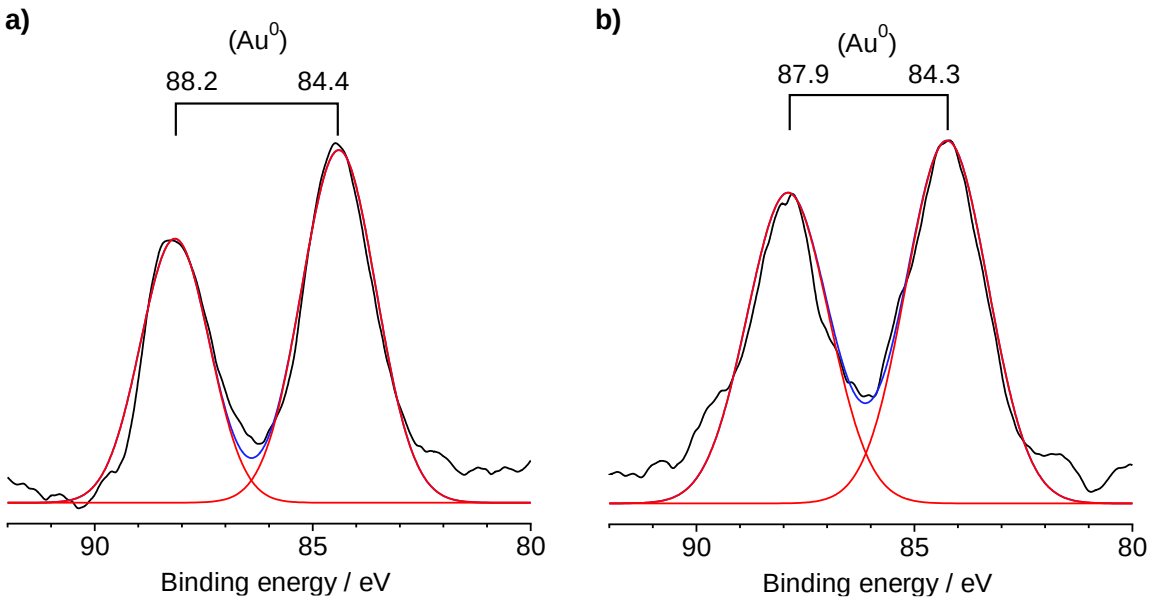

Fig. S2 XPS (Au 4f level) charts of AuNPs prepared by (a) thermal reduction (60 °C, 25 min) and (b) photoreduction (25 °C, 100 min) methods. The blue line is sum of the components.

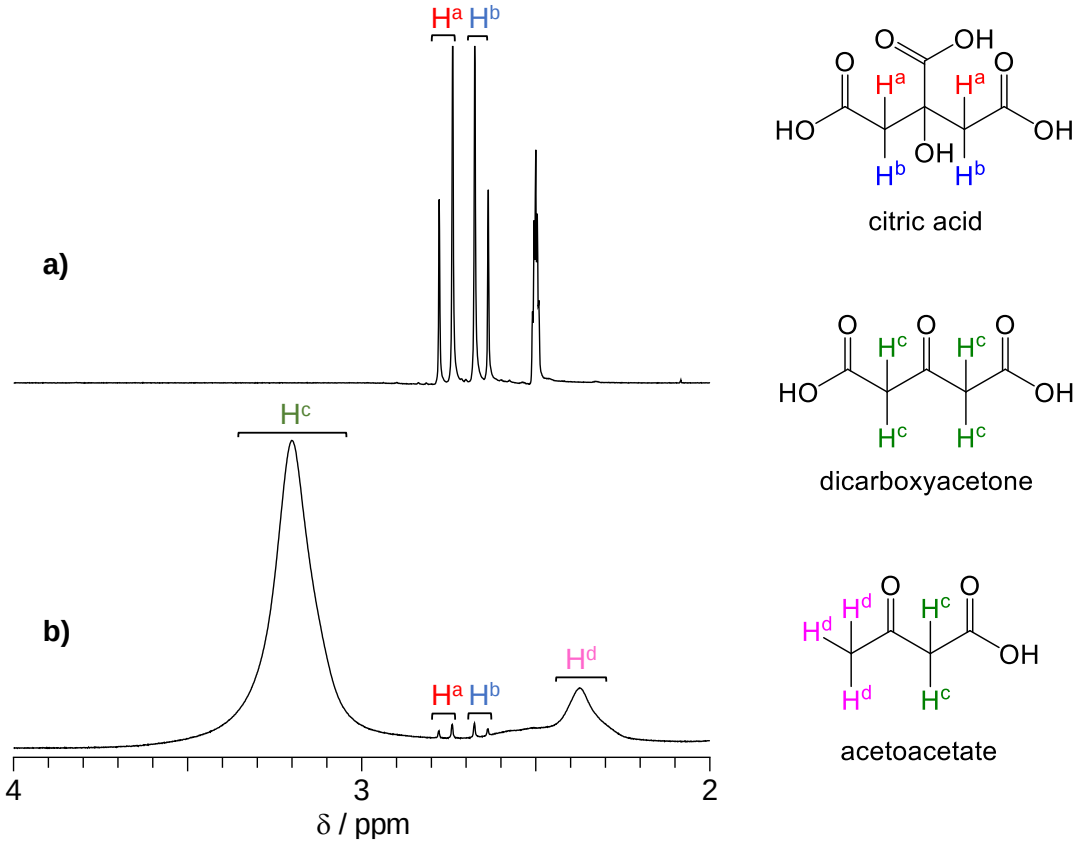

Fig. S3 ^{1}H NMR analysis (DMSO-d_6, 400 MHz) of (a) citric acid and (b) the oxidation products obtained after photoirradiation of water containing $HAuCl_4 \cdot 4H_2O$ (0.8 mM) and citric acid (2.0 mM) for 100 min. The AuNPs in the solution were removed by centrifugation. The resulting solution was concentrated by evaporation and dissolved in DMSO-d_6. The ratio of citric acid, dicarboxyacetone and acetoacetate was determined to be 2:55:10.

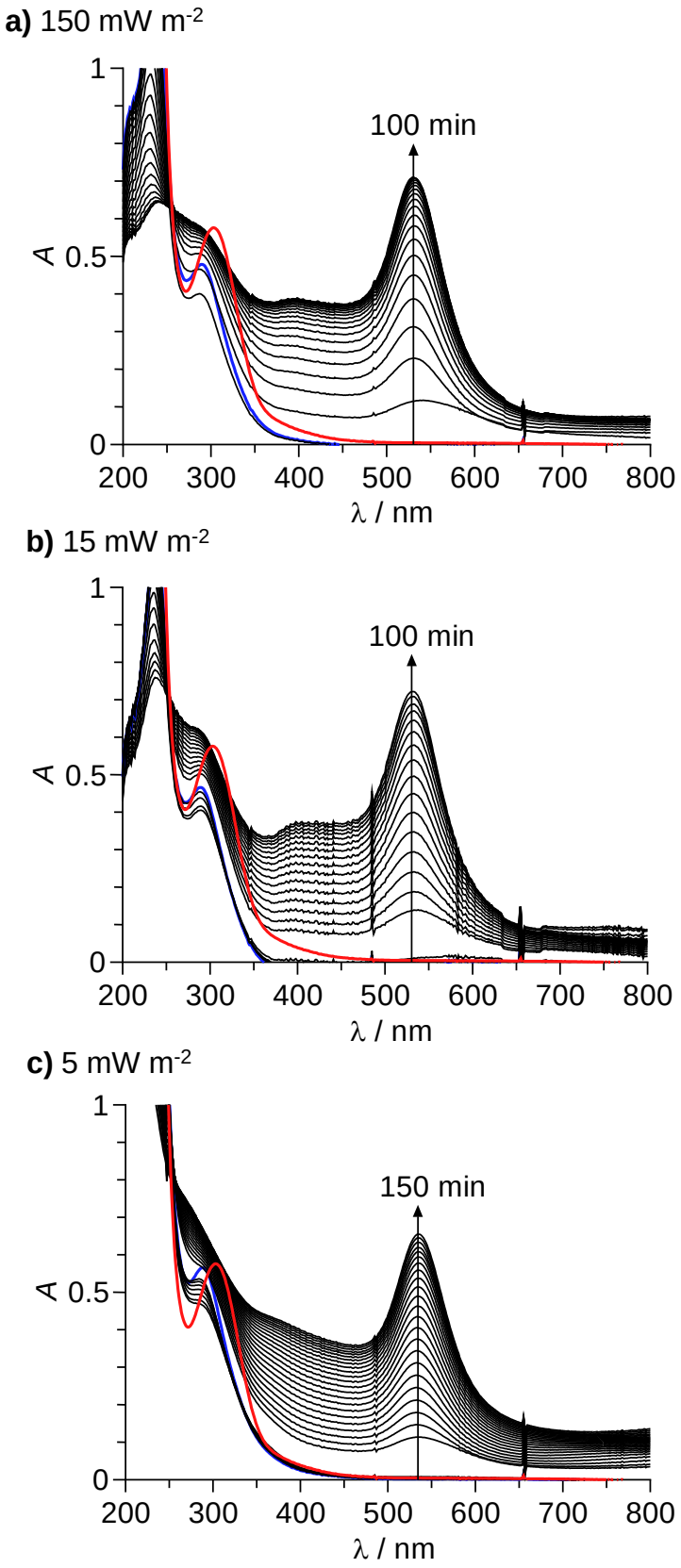

Fig. S4 Time-dependent change in absorption spectra of water containing $HAuCl_4 \cdot 4H_2O$ (0.2 mM) and citric acid (0.5 mM) during stirring at 25 °C under 254 nm irradiation at different light intensity. The red is the spectrum for the solution containing $HAuCl_4 \cdot 4H_2O$ at 25 °C, and the blue is the spectrum for the solution after addition of citric acid (1 min).

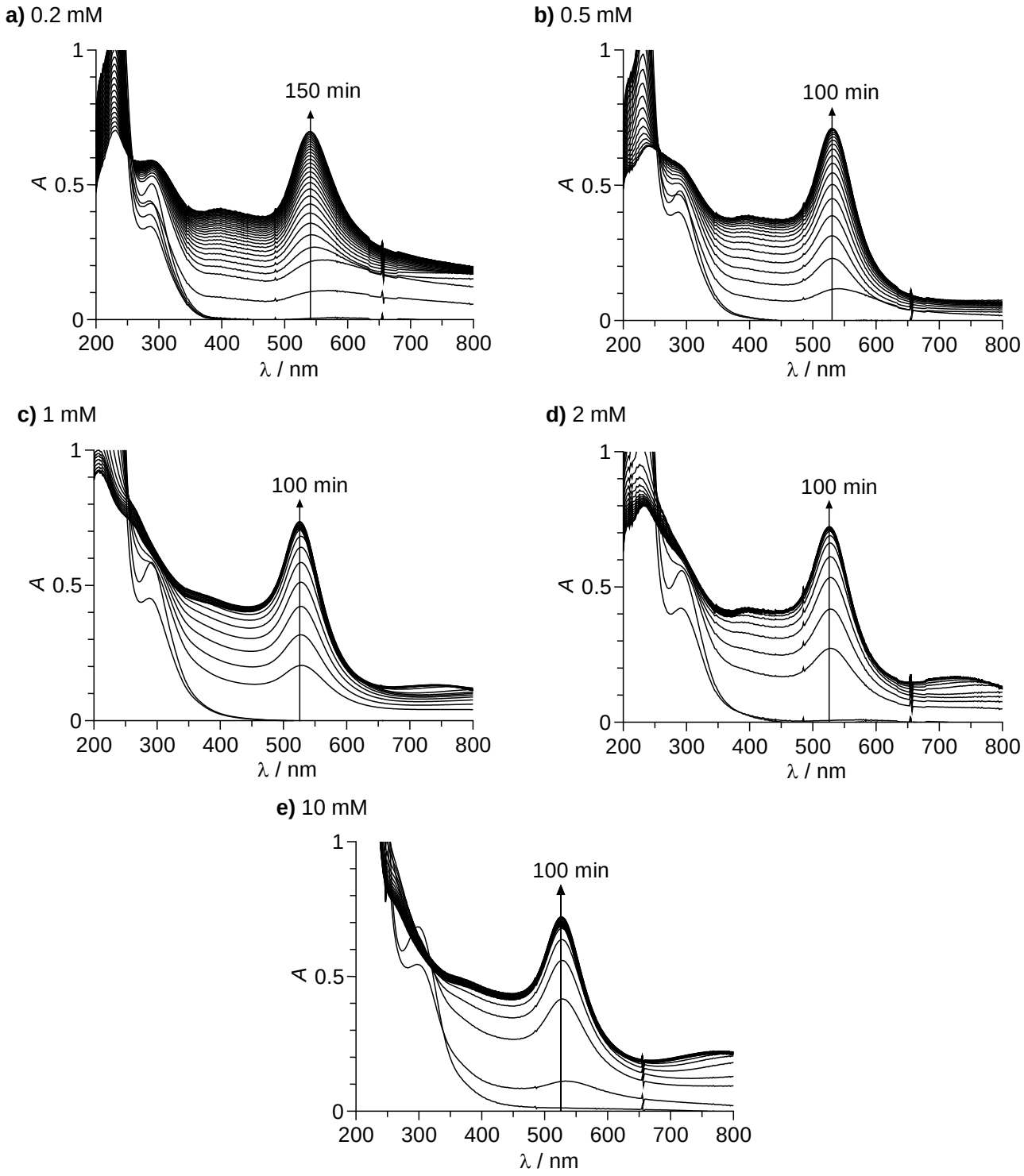

Fig. S5 Time-dependent change in absorption spectra of water containing $HAuCl_4 \cdot 4H_2O$ (0.2 mM) and different amount of citric acid during stirring at 25 °C under 254 nm irradiation (light intensity: 150 mW m^{-2}).

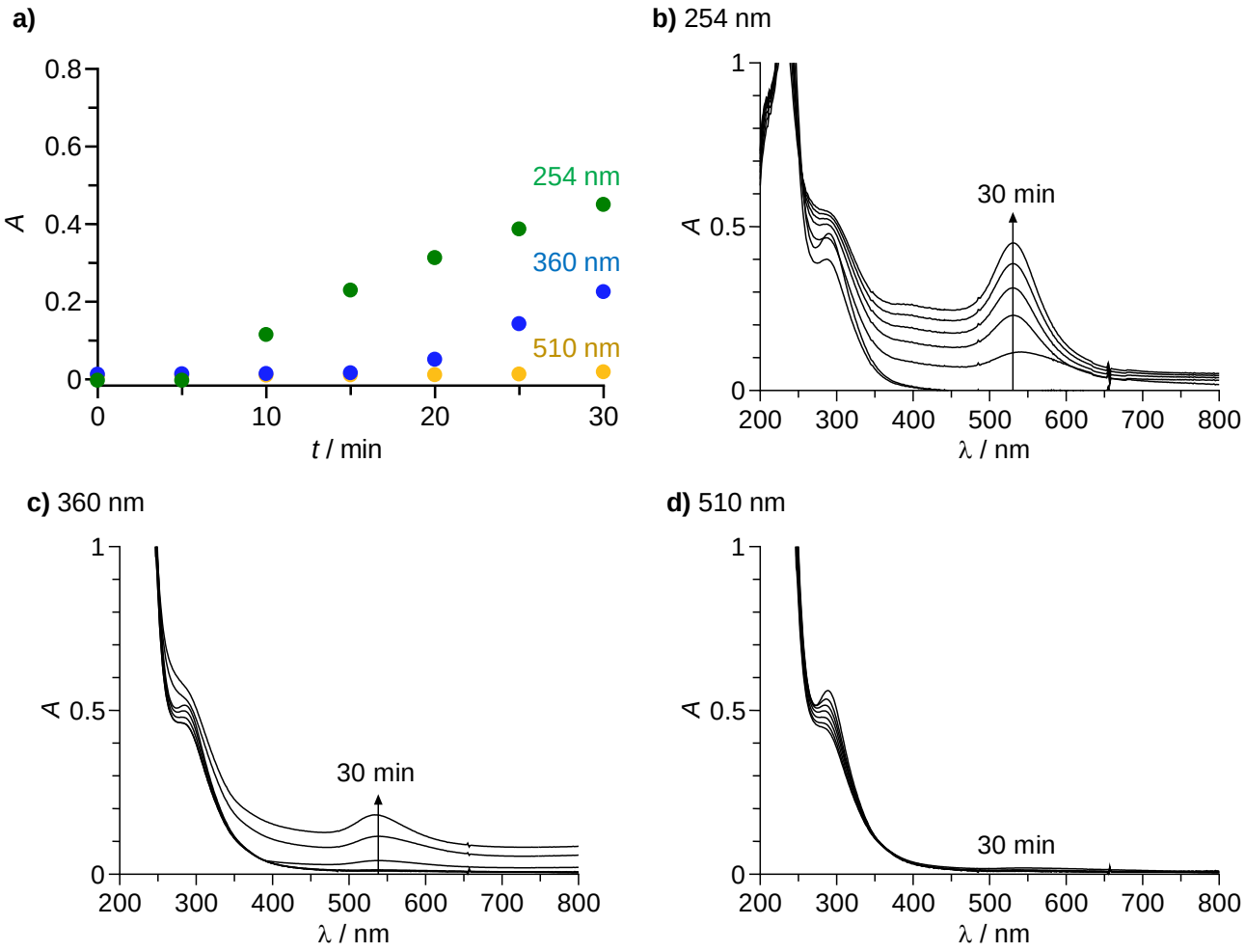

Fig. S6 Time-dependent change in (a) the LSPR absorbance and (b-d) absorption spectra of water containing $HAuCl_4 \cdot 4H_2O$ (0.2 mM) and citric acid (0.5 mM) obtained by stirring at 25 °C under light irradiation at different light wavelengths (light intensity: 150 mW m^{-2}).