

Electronic Supplementary Information

for

Polarization- and Wavelength-Dependent Defocused Scattering Imaging of Single Gold Nanostars with Multiple Long Branches

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This document contains two supplementary movies (Movies S1 and S2) and supplementary figures (Fig. S1 to S9).

Supplementary Movies

Movie S1: A movie to show single AuNSs deposited on a glass slide, which was measured at 700 nm with a temporal resolution of 100 ms. Almost all of the AuNSs were fixed on the glass slide, whereas some AuNSs were rotating on the glass slide.

Movie S2: A movie to show rotational dynamics of single AuNS rotating on a glass slide, which was measured at 700 nm with a temporal resolution of 100 ms. There was slight movement of the AuNS on the glass slide.

Supplementary Figures

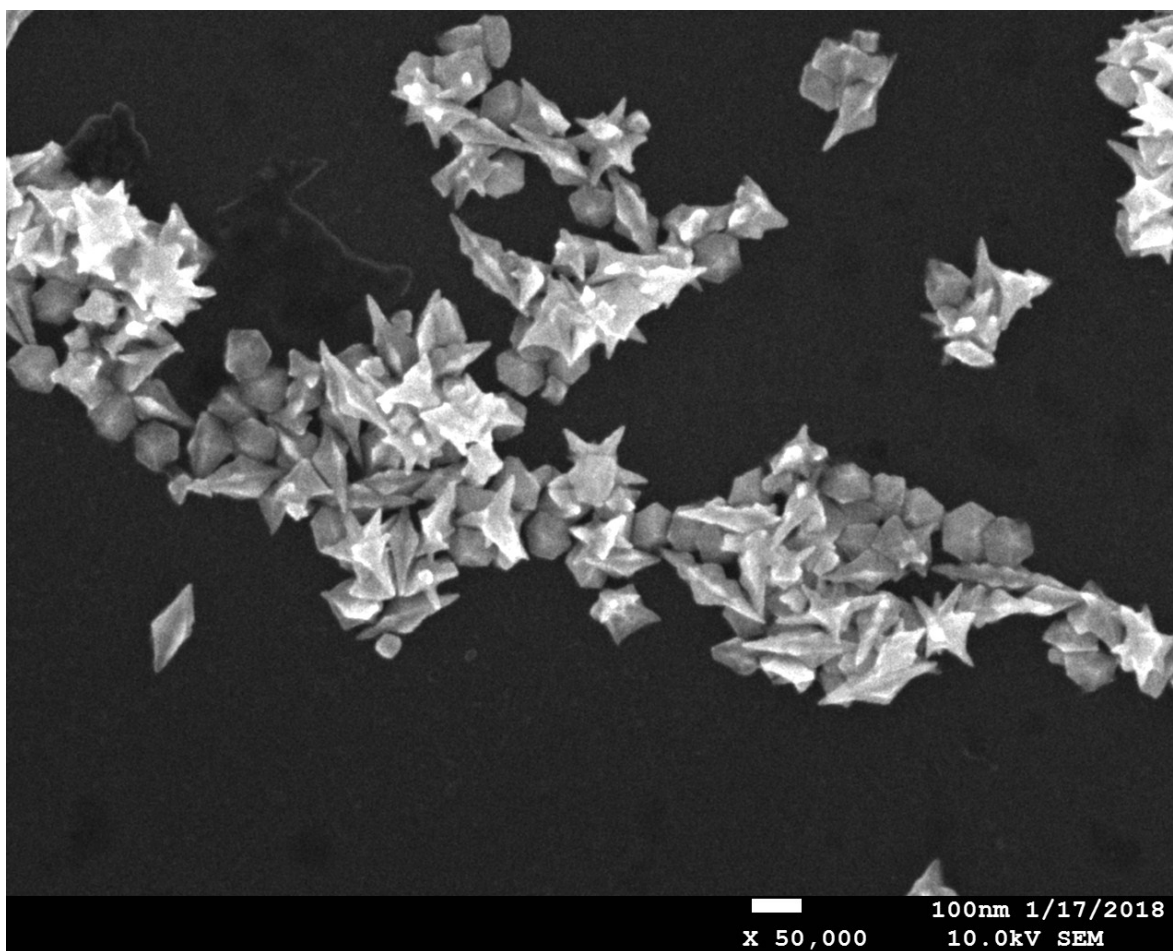


Fig. S1 SEM image of gold nanostars (AuNSs) with sharp and long branches.

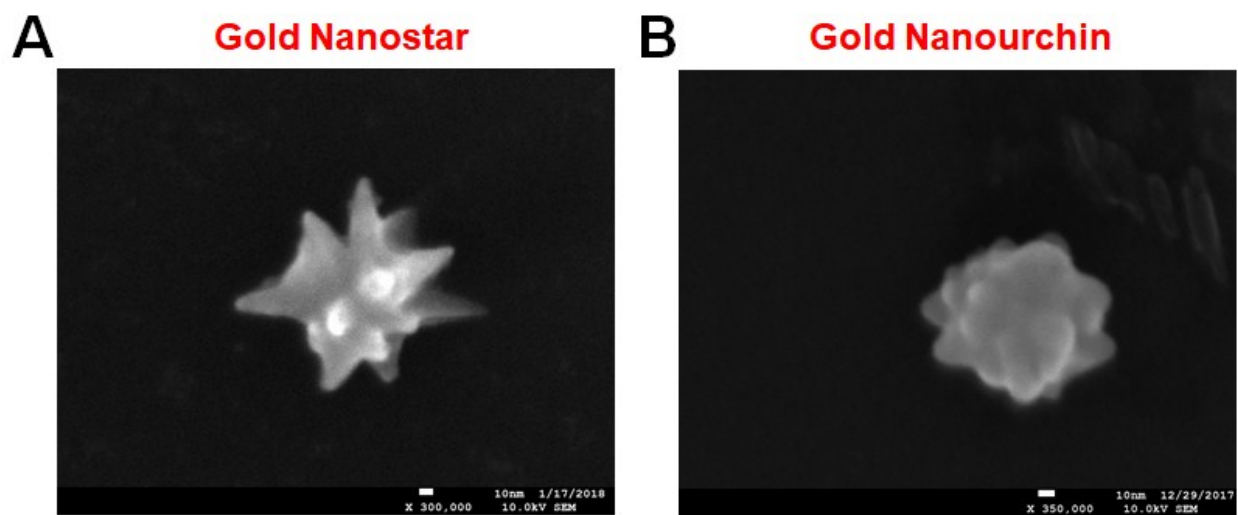


Fig. S2 (A) SEM image of single AuNS with long branches. (B) SEM image of single gold nanourchin (AuNU) with short branches in comparison with AuNS.

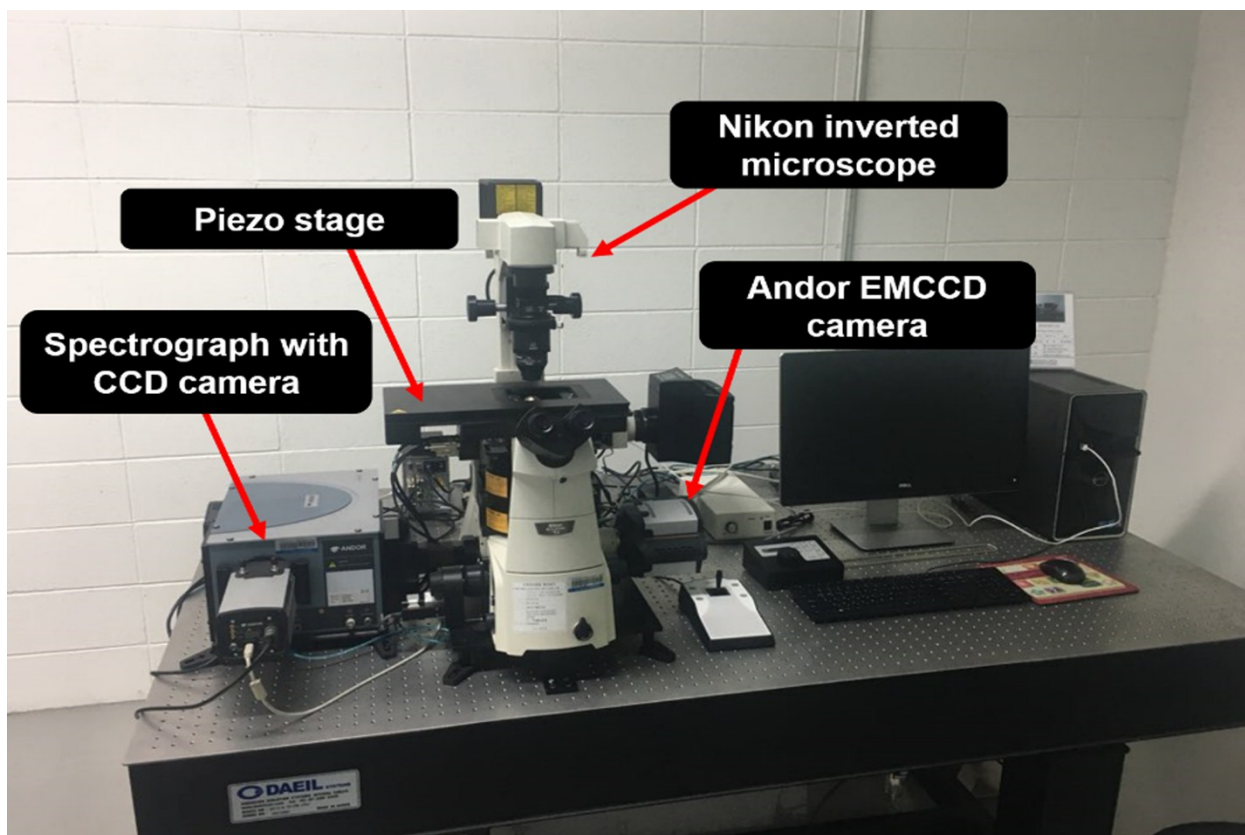


Fig. S3 A photograph to show the experimental setup for DF microscopy and spectroscopy.

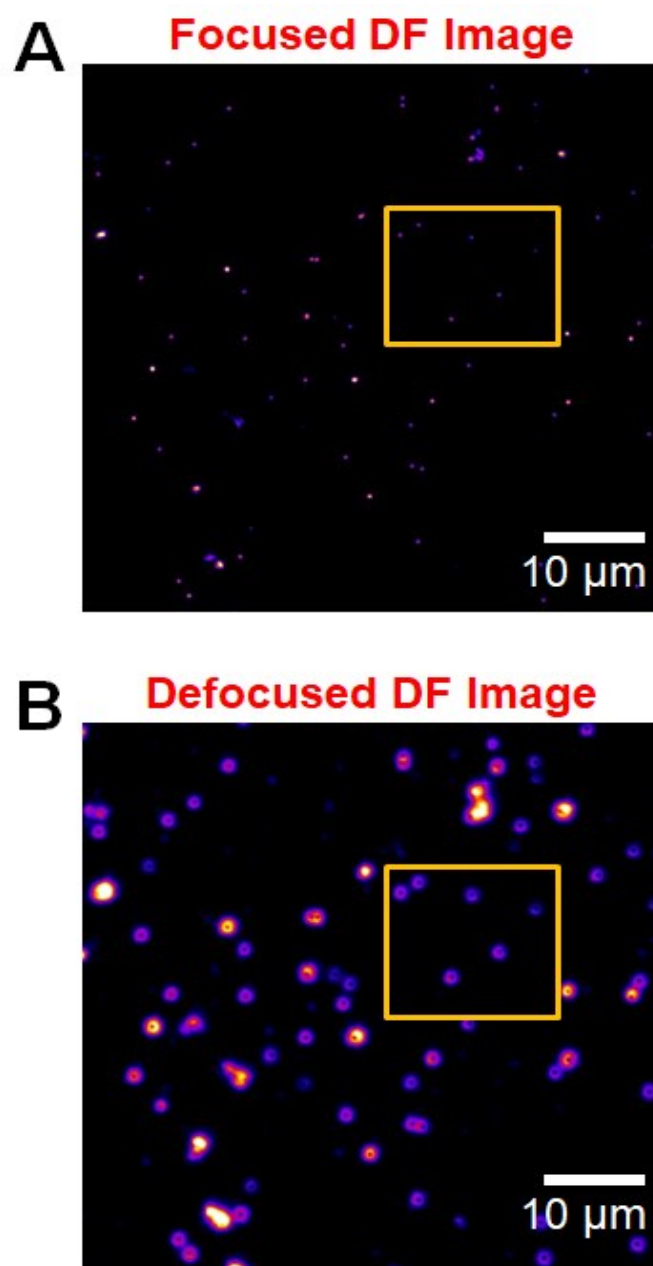


Fig. S4 (A) Focused DF image of AuNSs. (B) Defocused DF image of the same AuNSs in (A).

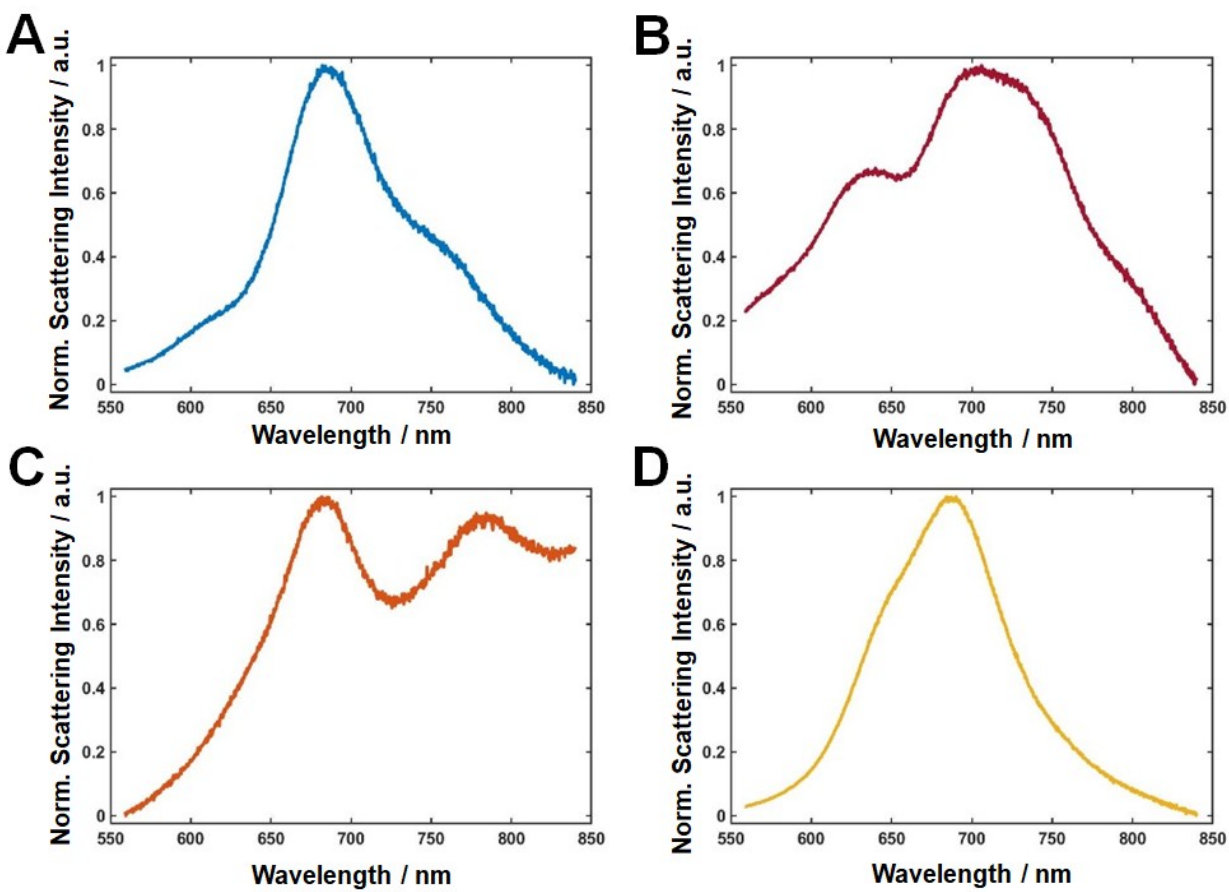


Fig. S5 Normalized scattering spectra of single AuNSs with multiple LSPR peaks.

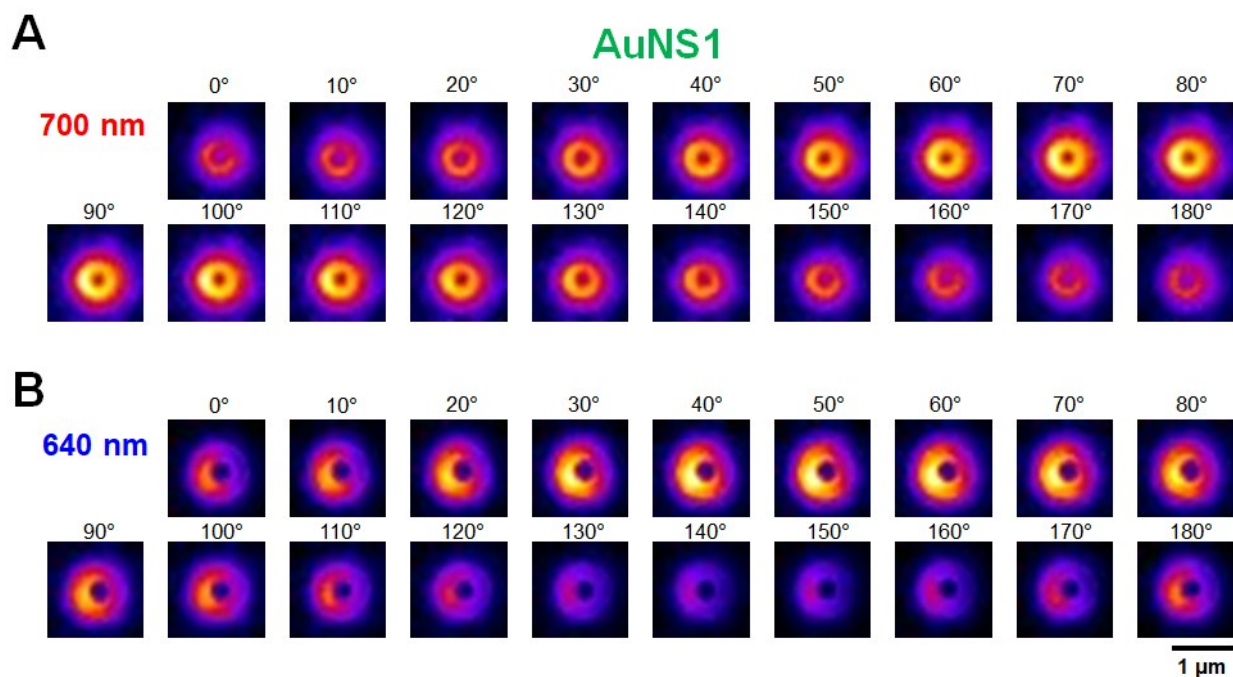


Fig. S6 (A) Polarization-dependent defocused DF scattering image patterns of AuNS1 from 0° to 180° at 10° increment at 700 nm. (B) Polarization-dependent defocused DF scattering image patterns of AuNS1 from 0° to 180° with 10° increments at 640 nm.

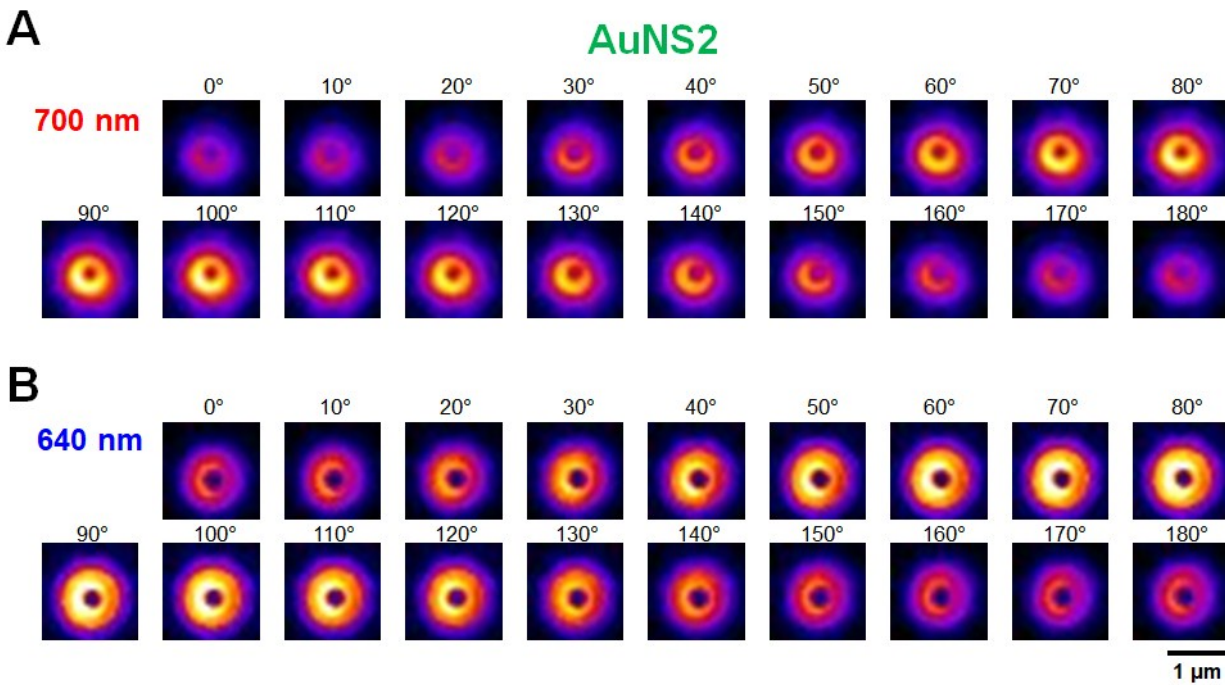


Fig. S7 (A) Polarization-dependent defocused DF scattering image patterns of AuNS2 from 0° to 180° with 10° increments at 700 nm. (B) Polarization-dependent defocused DF scattering image patterns of AuNS2 from 0° to 180° with 10° increments at 640 nm.

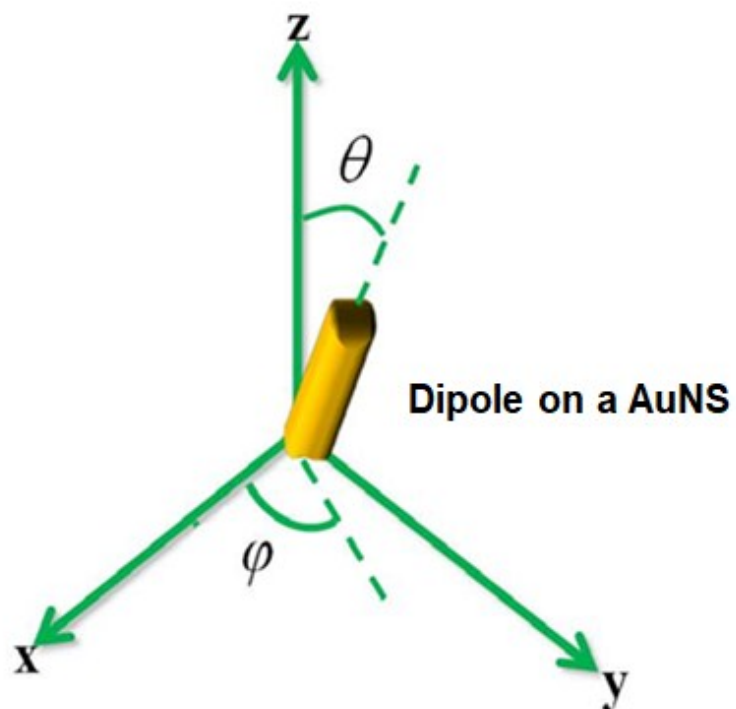


Fig. S8 Definitions of the polar angle θ and the azimuthal angle φ of a dipole on the AuNS in 3D space.

Defocused DF Images at 700-nm excitation

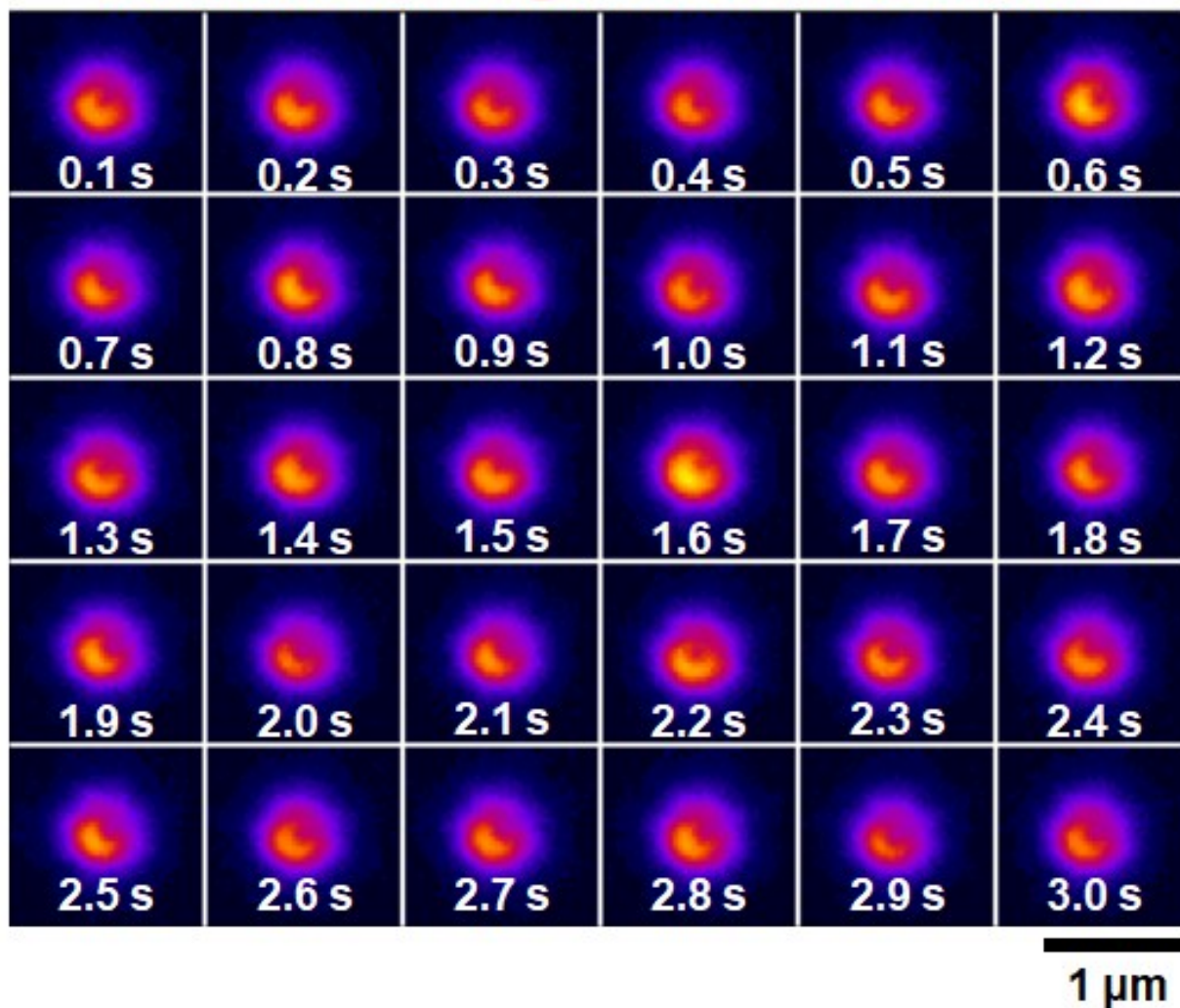


Fig. S9 30 consecutive defocused image patterns of single AuNS rotating on a glass slide, detected at 700 nm with a temporal resolution of 100 ms. See Movie S2.