

Supplementary Information

Plasmonic properties of gold nanoparticle clusters formed via applying an AC electric field

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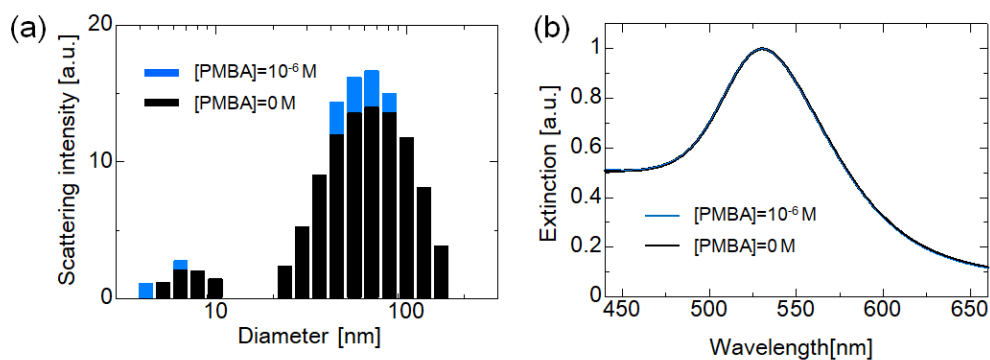


Fig. S1

Size distributions of Au NPs in the presence of PMBA (a) and UV-Vis spectra of Au NPs before and after the incubation of PMBA (b).

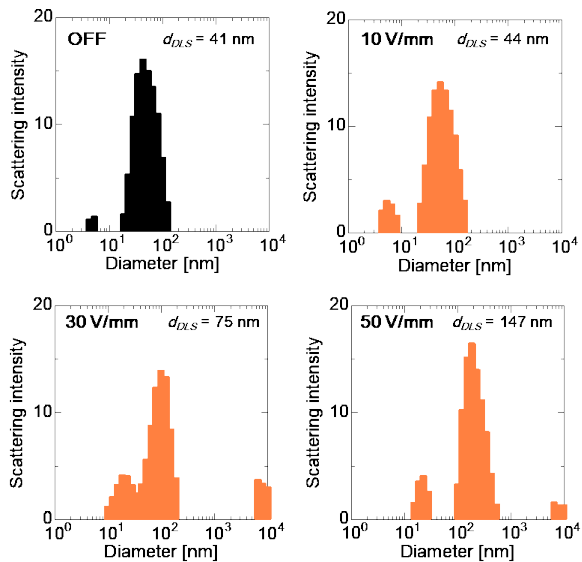


Fig. S2

Size distributions of Au NPs in suspensions measured by the field application of 1 MHz in the field strengths from 0 V/mm to 50 V/mm.

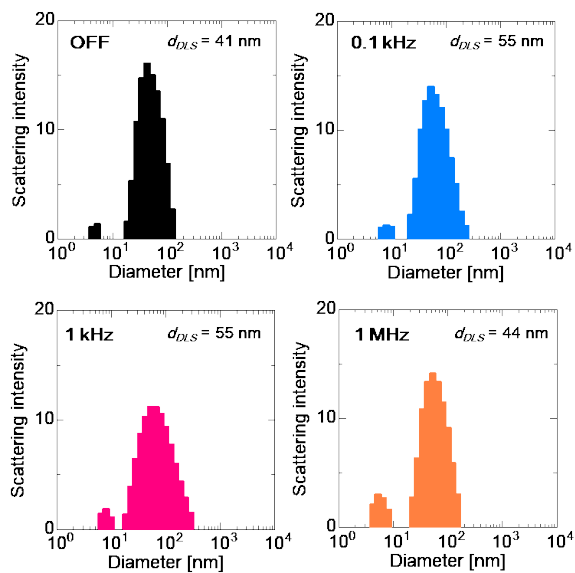


Fig. S3

Size distributions of Au NPs in suspensions measured by the field application at 10 V/mm in the frequency range from 0.1 kHz to 1 MHz.

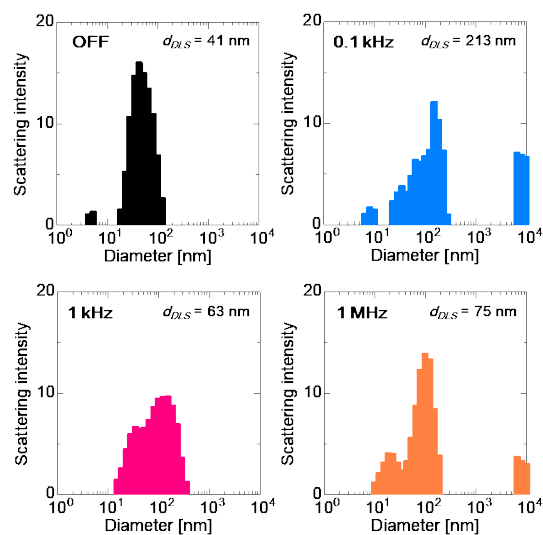


Fig. S4

Size distributions of Au NPs in suspensions measured by the field application at 30 V/mm in the frequency range from 0.1 kHz to 1 MHz.

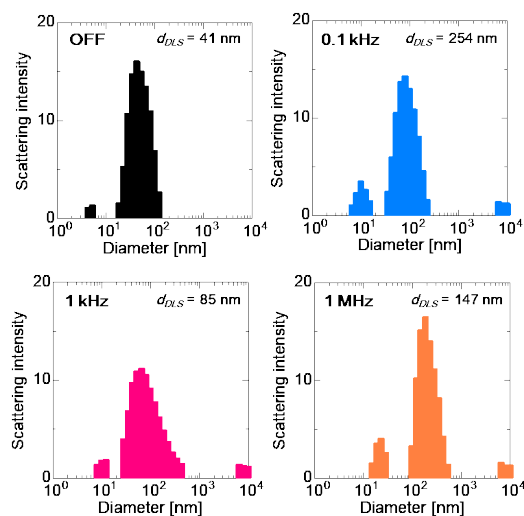


Fig. S5

Size distributions of Au NPs in suspensions measured by the field application at 50 V/mm in the frequency range from 0.1 kHz to 1 MHz.

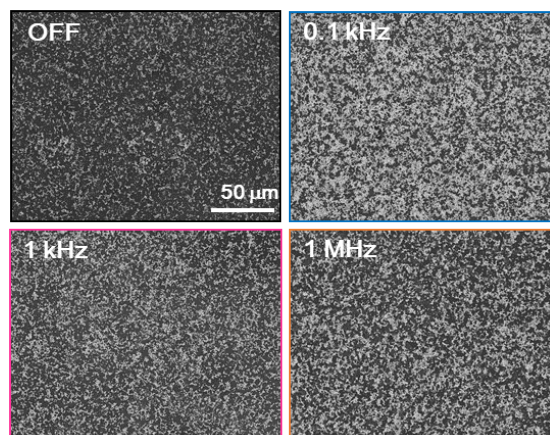


Fig. S6

SEM images of Au NPs dried far from the Cu electrodes on a glass substrate observed by the field application at 30 V/mm in the frequency range from 0.1 kHz to 1 MHz.

Table S1 Summary of the relationship between clustering states and plasmonic properties of Au NPs.

Field strengths	Frequencies	530-nm intensities ^{a)}	Sizes measured in DLS ^{b)}	Relative intensities of Raman peaks of PMBA ^{c)}
0 V/mm		0.43	41 nm	1.0 / 1.0
10 V/mm	0.1 kHz	0.40	55 nm	
	1 kHz	0.40	55 nm	
	1 MHz	0.39	44 nm	
30 V/mm	0.1 kHz	0.34	213 nm	0.21 / 0.51
	1 kHz	0.36	63 nm	1.2 / 1.2
	1 MHz	0.30	75 nm	1.3 / 1.5
50 V/mm	0.1 kHz	0.26	254 nm	
	1 kHz	0.37	85 nm	
	1 MHz	0.20	147 nm	

^{a)} 530-nm intensities in the UV-Vis spectra shown in Fig.3

^{b)} DLS sizes of Au NPs measured in suspension

^{c)} Relative intensities of the Raman peaks at 1020 cm⁻¹ and 1391 cm⁻¹ in Fig.4.

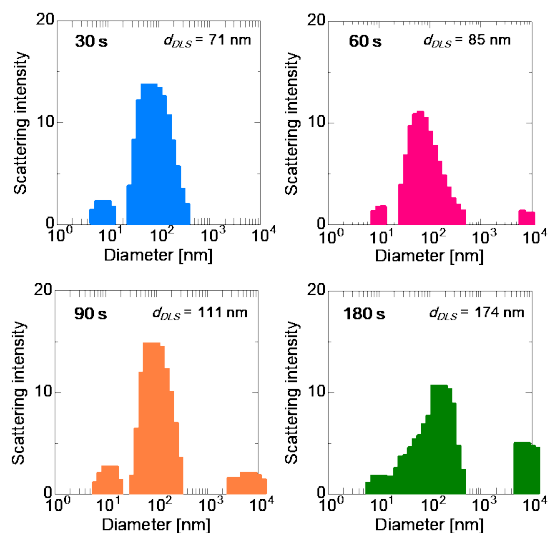


Fig. S7

Size distributions of Au NPs in suspensions measured by the field application of 1 MHz at 30V/mm in the application time from 30 s to 180 s.

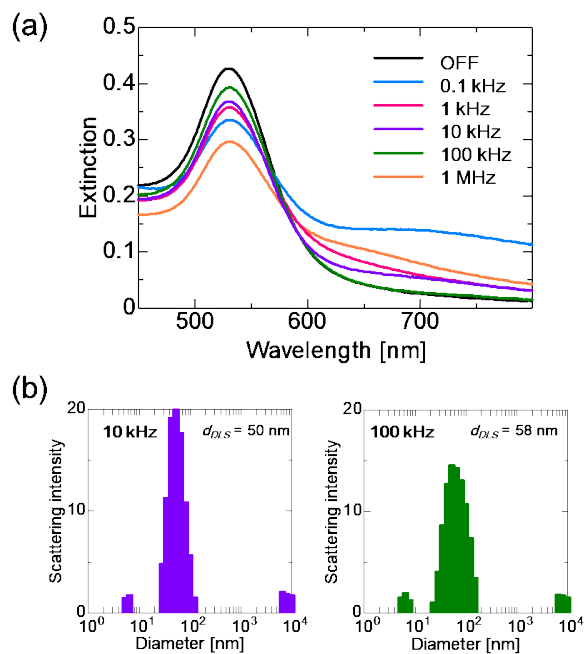


Fig.S8

UV-Vis spectra (a) and size distributions (b) of Au NPs in suspensions measured by the field application at 30 V/mm in the frequency 10 kHz and 100 kHz