Supporting Information

for

Au@Ag SERRS tags coupled to a lateral flow immunoassay for the sensitive detection of Pneumolysin

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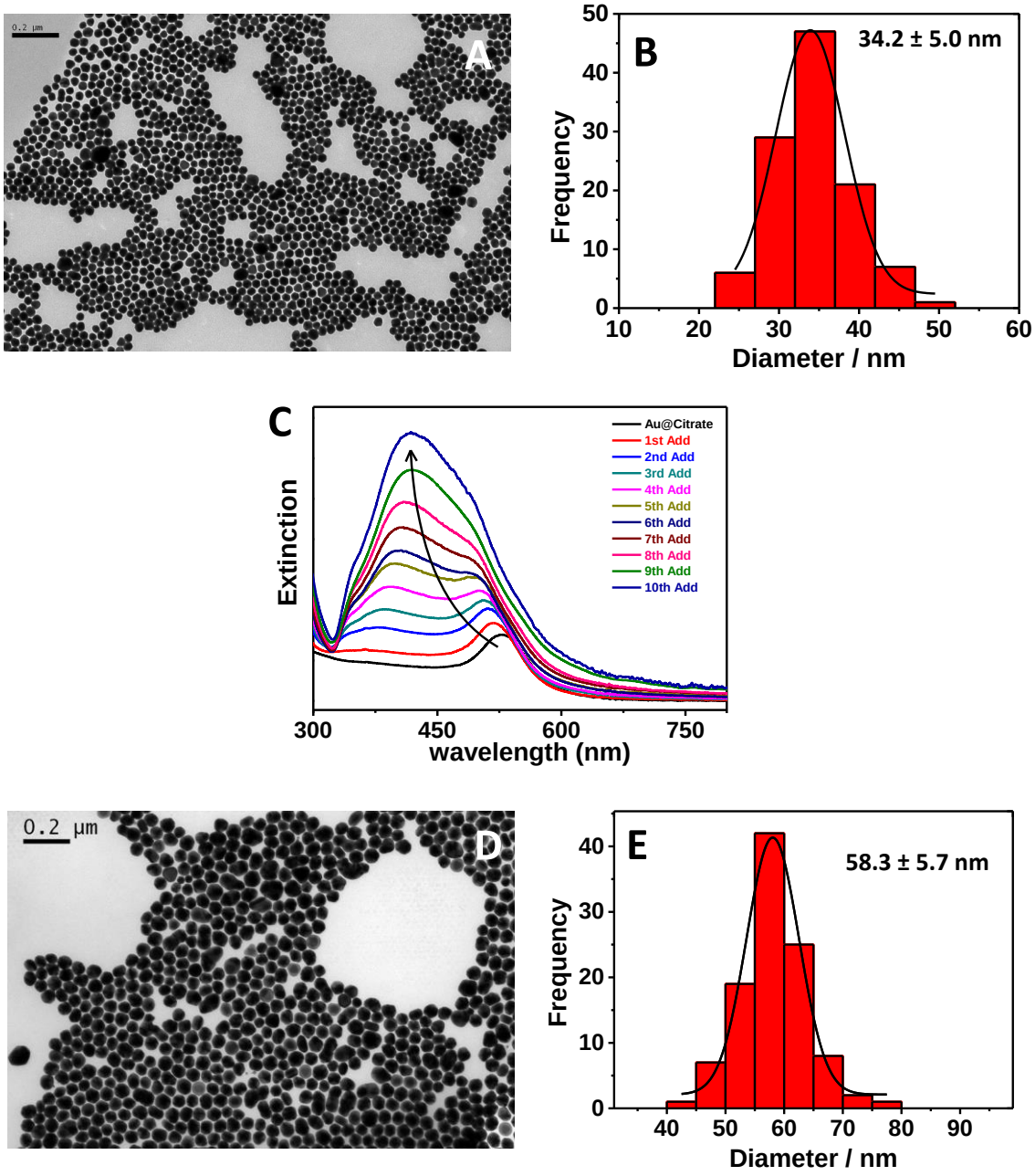
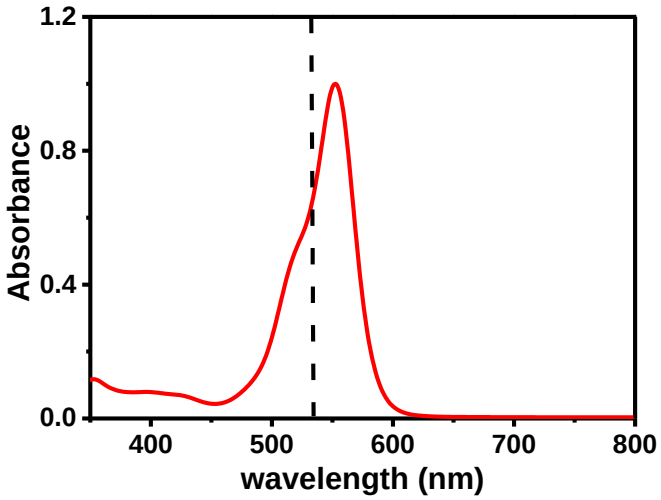


Figure S1. (**A**) Representative TEM image of the Au@citrate NPs used as seeds. (**B**) Size distribution histograms of the Au core seeds. (**C**) Time evolution spectra during the Au@Ag NPs synthesis (see experimental section for details), the Ag coating lead to an absorption minimum in the spectrum at ~320 nm, which can be assigned to Ag interband transitions in this spectral region and is inherent to the Ag dielectric properties and independent of particle shape and size. Additionally, the LSPR band intensity increased as more Ag was reduced, along with a significant blue shift. Both features can be explained by the increase in particle volume and the dielectric properties of silver. A new band was also seen to gradually appear around 400 nm, which eventually merged with the band at 520 nm characterisirc of the Au@citrate seeds. (**D**) Representative TEM image of the Au@Ag NPs. (**E**) Size distribution histograms of the Au@Ag NPs.



Figures S2. UV-visible absorption spectrum of an aqueous solution of rhodamine isothiocyanate. The dashed line indicates the 532 nm excitation laser line.

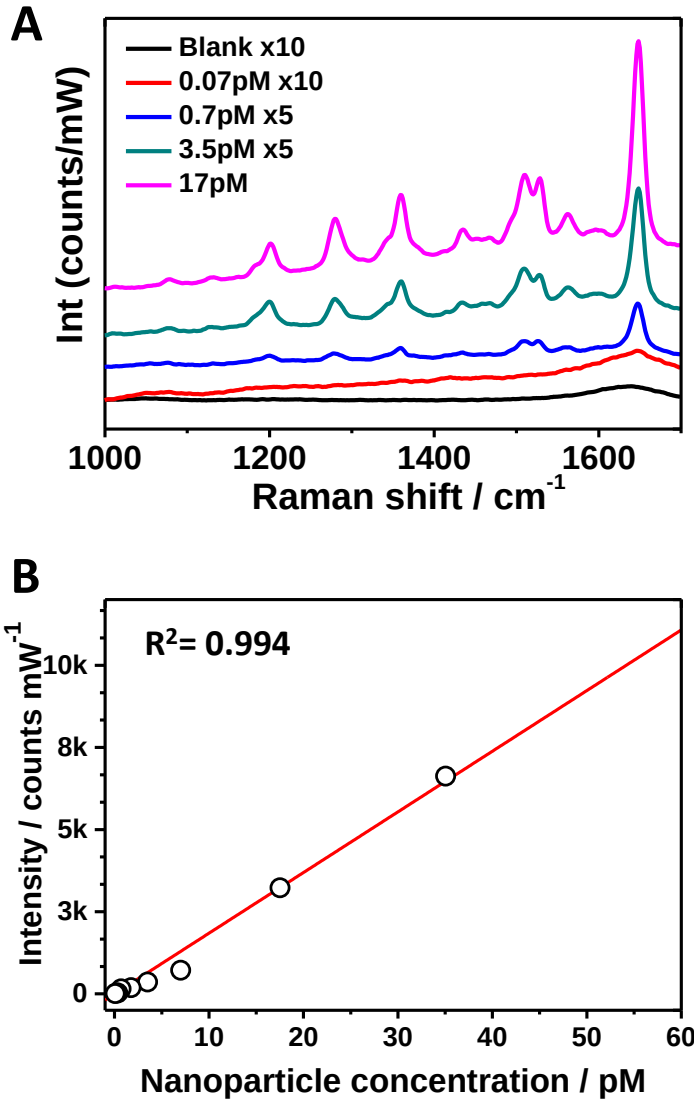


Figure S3. (A) Representative SERRS spectra of the enconded Au@Ag tags at different nanoparticle concentration as indicated. (B) SERRS intensity representation of the most intense signal of rhrodamine dye (1684 cm^{-1}) as a function of the Au@Ag NP concentration. The excitation laser line was 532 nm.

Table S1. Summary of the properties of the UniSart nitrocellulose membranes employed in the LFIA.

Membrane	Capillary flow (s/4cm)
CN95	78 ± 5.4
CN140	117 ± 6.4
CN150	141 ± 4.4

Table S2. Intensity values for the SERRS-based LFIA

[Ply-r] ng/ml	SERRS	
	Average intensity	Standard deviation
50	507057	70417.94
10	241406	105159.5
5	127750.5	79093.4
1	77581	11561.2
0.5	40024	12294.6
0.1	22927.7	6269.2
0.05	18032	4941.2
0.01	4988.7	864.6
0	1220	125