Electronic Supplementary Information

Triangular gold nanoplate/two-dimensional nano mica platelets with 3D lightning-rod effect as flexible nanohybrid substrates for SERS bacterial detection

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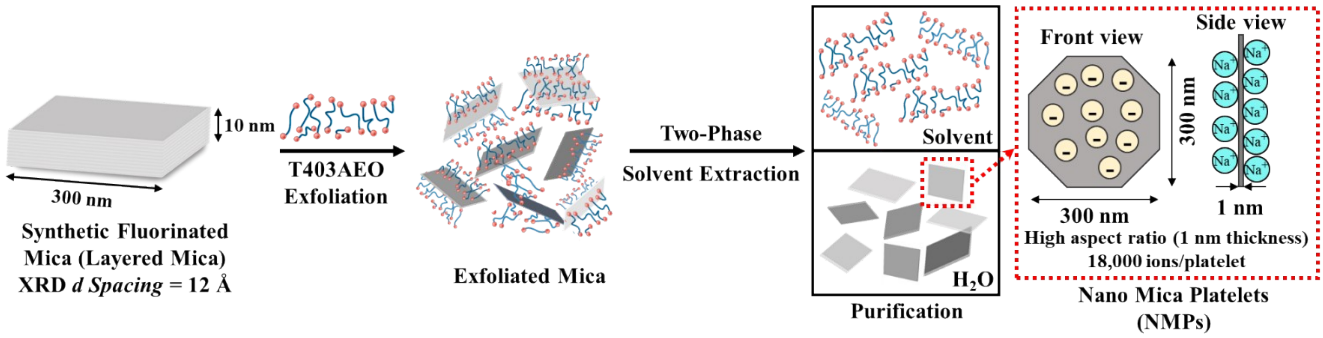

Fig. S1 Schematic diagram of one-step exfoliation synthesis. Mica with stacked-layer structure is exfoliated into nano mica platelets (NMPs), and macromolecules on the surface of the mica sheets are separated by extraction and filtration.

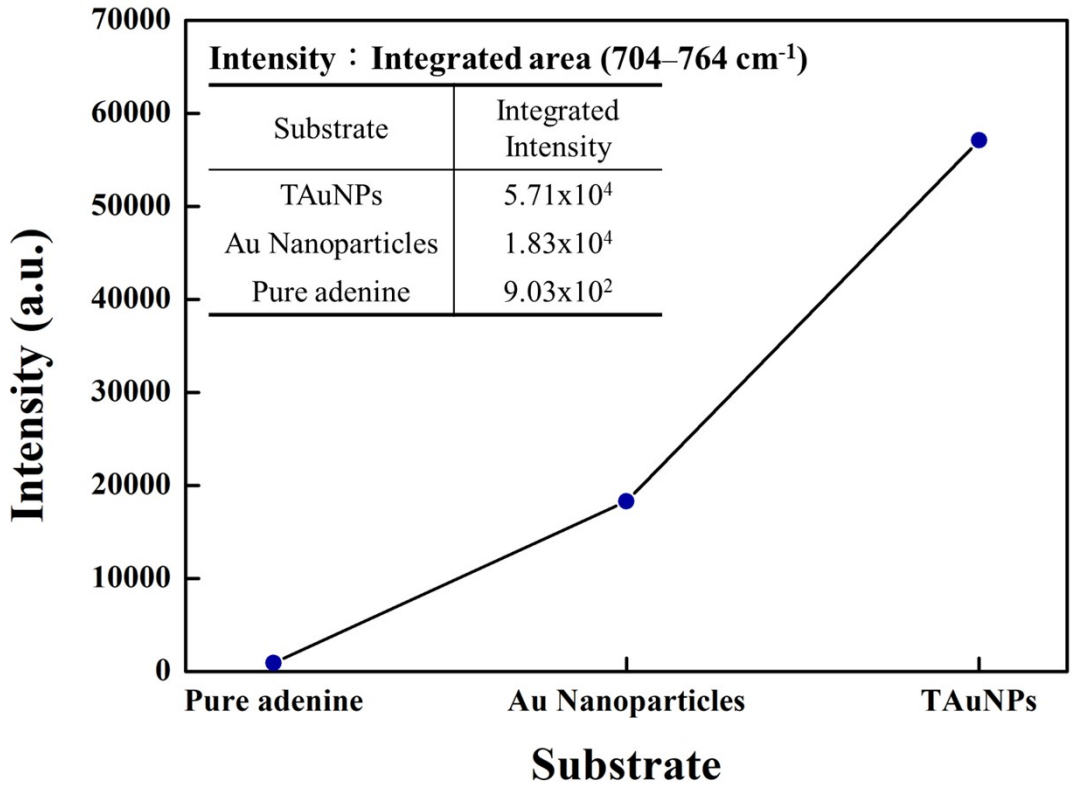

Fig. S2 Integrated intensity of characteristic peaks of adenine (10^{-2} M) at 704–764 cm^{-1} detected using substrate plates of gold nanoparticles and TAuNPs. Integrated intensities of pure adenine, gold nanoparticles, and TAuNPs were 903, 18,283, and 57,091, respectively.

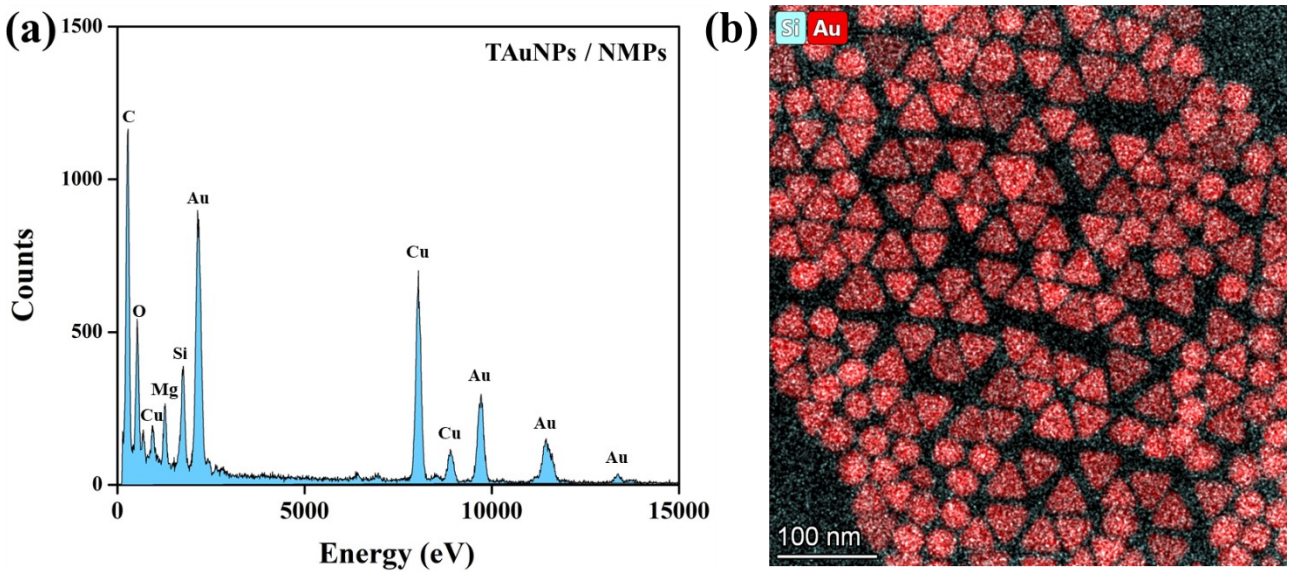

Fig. S3 (a) Elemental composition of TAuNP/NMP composite identified by EDS, where NMPs contained Si, O, Mg, and other elements. (b) Growth of TAuNPs on the surface of NMPs observed by EDS mapping, where the red area is Au, and the cyan area is Si.

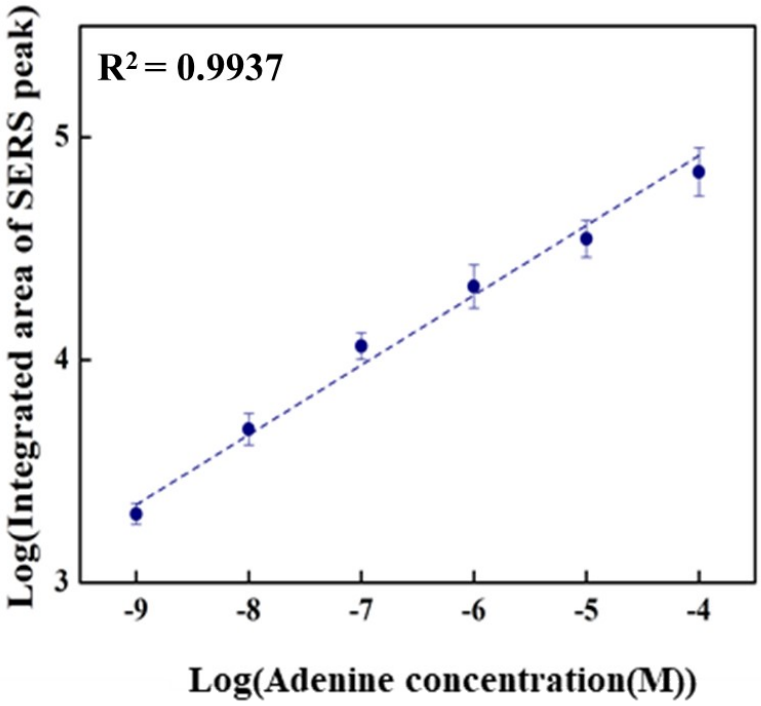

Fig. S4 Logarithm of LOD concentration of adenine versus logarithm of integrated intensity (704–764 cm^{-1}).

Table S1. Synthesis parameters of TAuNPs with different edge lengths, where the main variable parameters are the concentrations of the reducing agent (ascorbic acid, AA) and NaOH.

Sample	CTAC (0.1 M)	$HAuCl_4$ (24 mM)	KI (0.01 M)	AA (64 mM)	NaOH (0.1 M)	Edge length
TAuNP-1	2 mL	0.1 mL	60 μL	100 μL	10 μL	83.48 nm
TAuNP-2	2 mL	0.1 mL	60 μL	90 μL	10 μL	68.12 nm
TAuNP-3	2 mL	0.1 mL	60 μL	80 μL	10 μL	53.75 nm
TAuNP-4	2 mL	0.1 mL	60 μL	60 μL	10 μL	44.60 nm
TAuNP-5	2 mL	0.1 mL	60 μL	100 μL	20 μL	34.18 nm

Table S2. Summary of various Au-related nanohybrid substrates for SERS.

Hybrid composition	Analyte molecule or bacteria detected	SERS LOD[a]/EF[b]	Reference
AuNPs	Adenine	$3.5x10^{-8}$ M/1.0×10^6	S1
AuNPs [c]	*Staphylococcus aureus*	35 CFU/mL	S2
AuNPs/silicate	Adenine	10^{-9} M/Not given	S3
AuNPs-FePt@SiO_2	Adenine	Not given/2.0×10^7	S4
AuNPs/PDMS [d]	*Staphylococcus aureus*	13 CFU/mL	S5
Fe_3O_4@AuNPs-Apt [e]	*Staphylococcus aureus*	25 CFU/mL	S6
TAuNPs/NMPs	(1) Adenine (2) *Staphylococcus aureus*	(1) 10^{-9}M/5.7×10^7 (2) 10^2 CFU/mL	Our work

[a] LOD concentration

[b] Enhancement factor (EF) of SERS activity was calculated as EF = $(I_{SERS}/C_{SERS})/(I_{norm}/C_{norm})$.

[c] The aptamer was changed to 2 μL 10^{-4} mol/L thiolated *S. aureus* aptamer.

[d] An aptamer (Apt 1) was modified on the substrate through Au–S bond as capture probes.

[e] A thiolated aptamer (SH-Apt) was modified on the Fe_3O_4@Au substrate.

References

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