Supporting information for:

Microplasma-printed Au-based SERS sensing platform for ultra-sensitive chemical analyte detection

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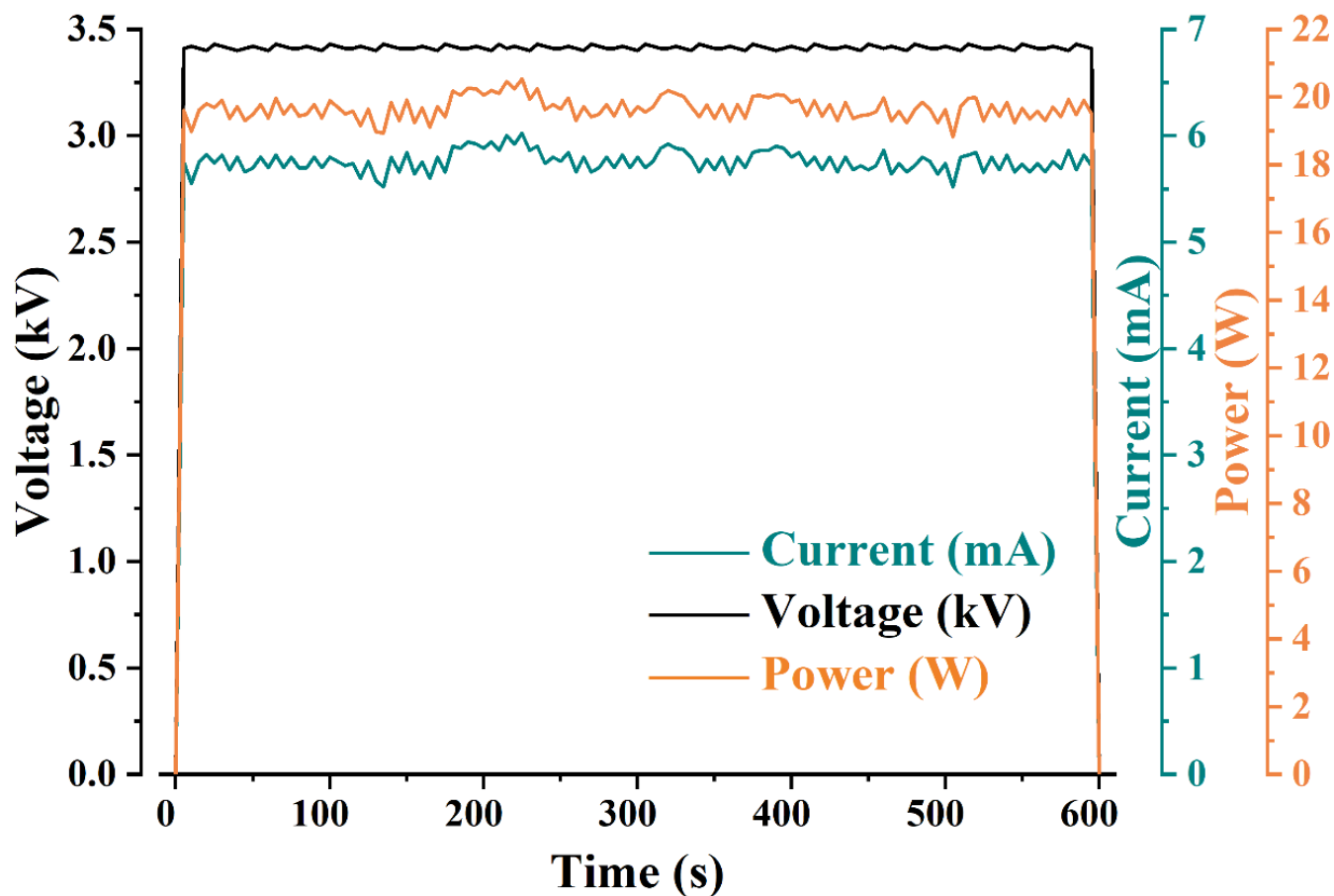
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Fig. S1 Temporal dynamics of voltage (V) and current (I) characteristics during the microplasma-assisted fabrication of
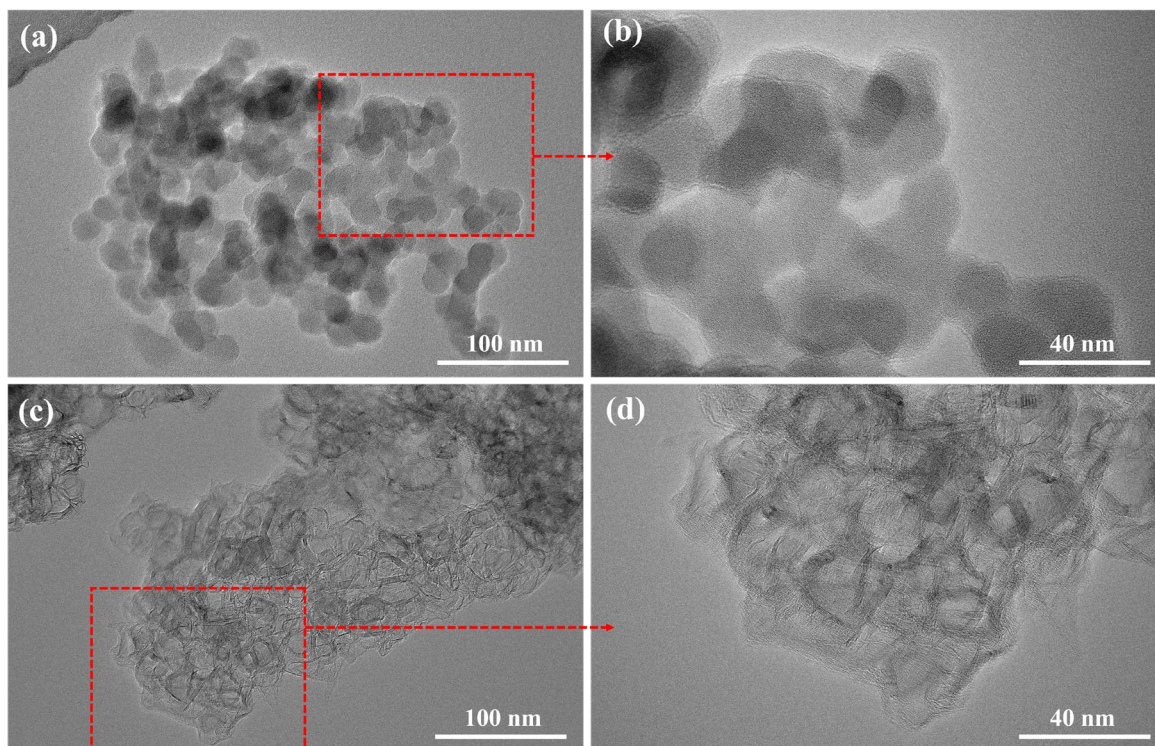
the Au-based platforms.

Fig. S2 Salient TEM images of the original SiO_2 particles before plasma processing: (a, b) SiO_2-25; (c, d) SiO_2-50.
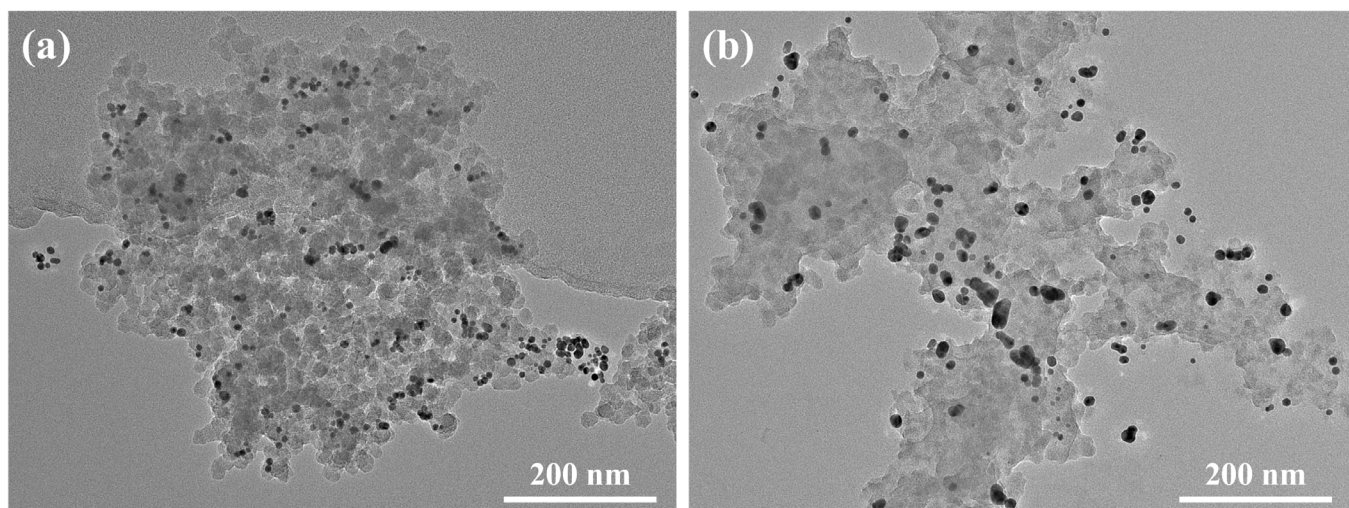
Fig. S3 TEM images of (a) Au/SiO$_2$-25 nanoparticles prepared at conditions 2; (b) Au/SiO$_2$-50 nanoparticles prepared at conditions 3.
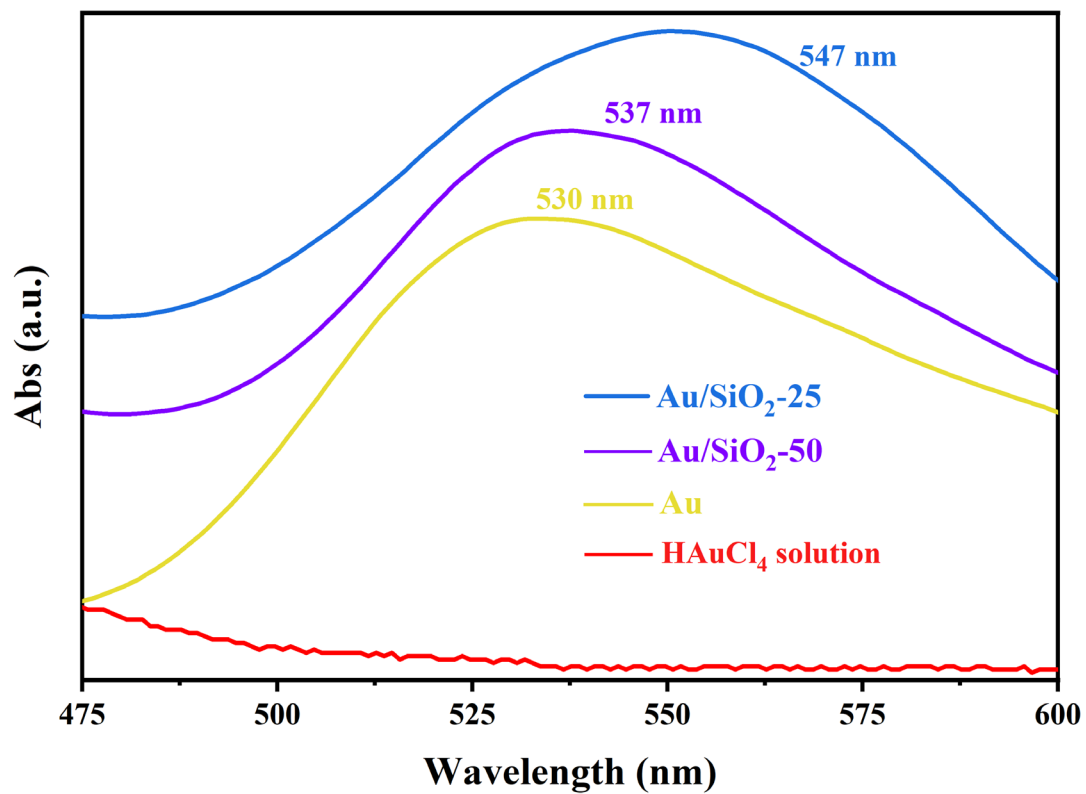
Fig. S4 UV-Vis absorption spectra of the HAuCl₄ solution as well as AuNPs and Au/SiO₂ nanoparticles prepared at conditions 1-3.
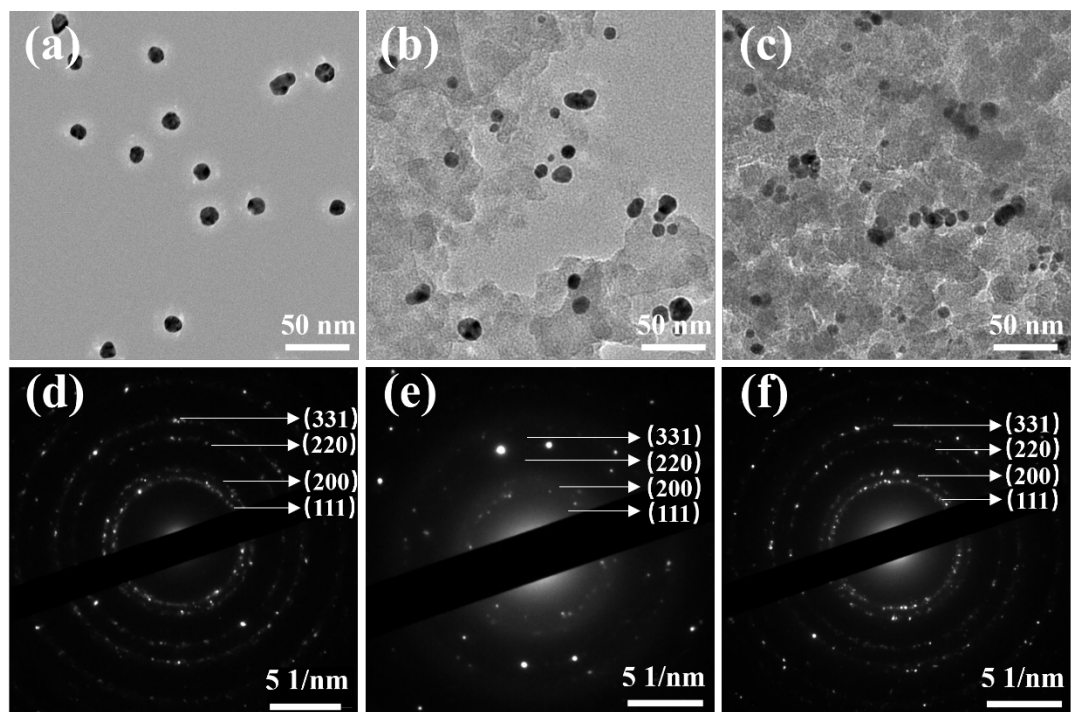
Fig. S5 (a-c) TEM images of the Au-based nanoparticles obtained at conditions 4-6: (a) AuNPs; (b) Au/SiO$_2$-25 nm, (c)

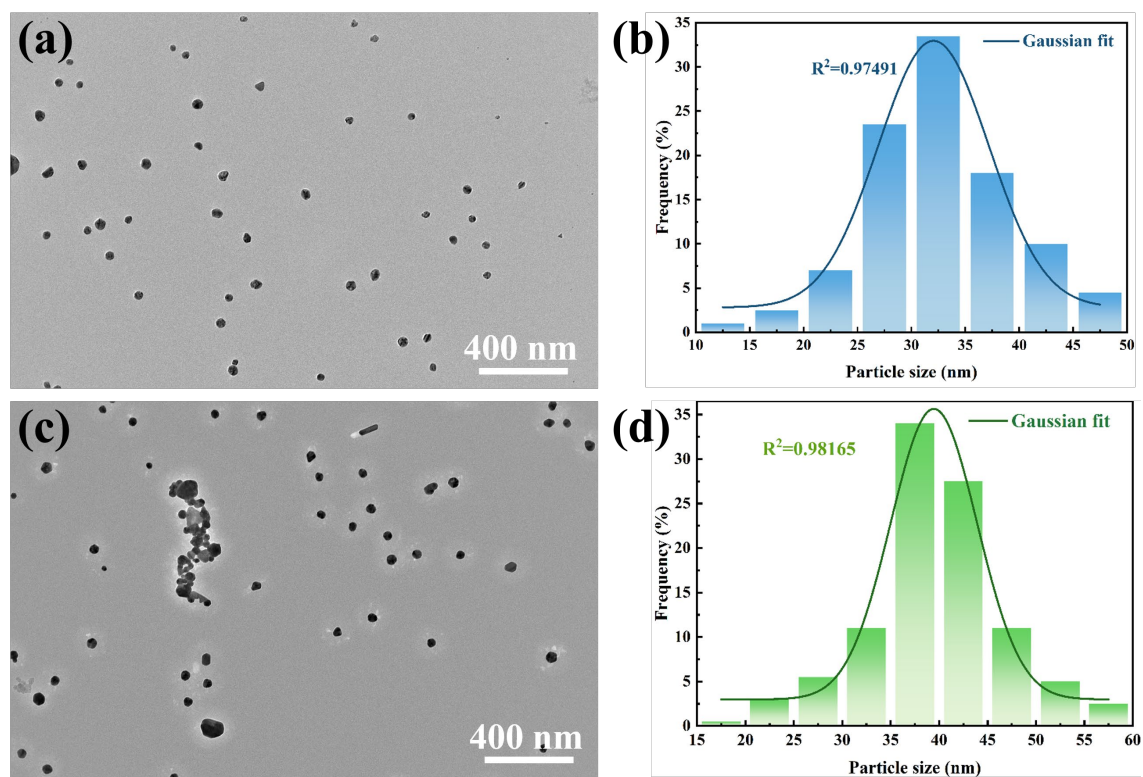Au/SiO$_2$-50 nm. (d-f) The relevant SAED images.

Fig. S6 TEM images and size distribution diagrams of the AuNPs prepared at plasma power of: (a, b) 10 W; (c, d) 20 W.
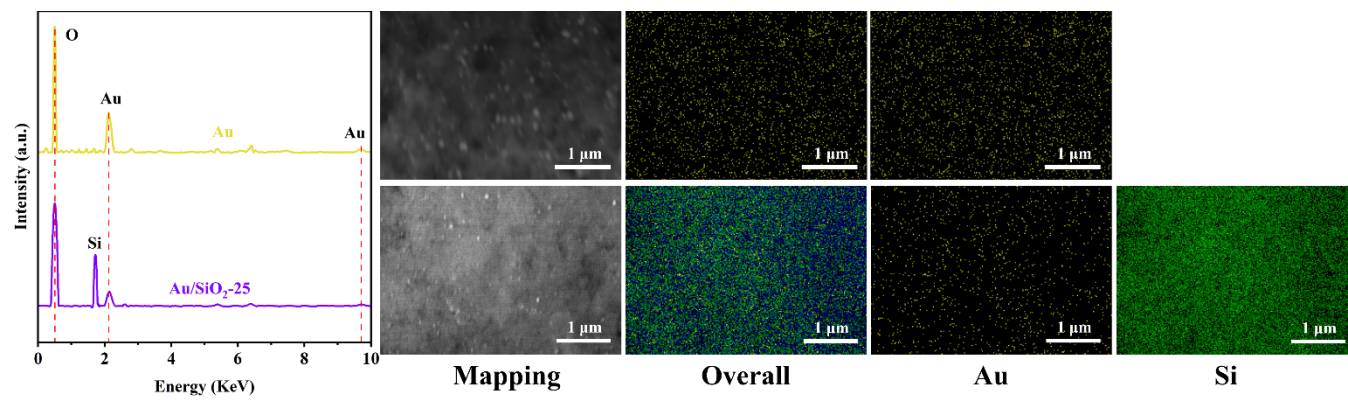
Fig. S7 EDX spectra and elemental distribution of the microplasma-fabricated AuNPs-platform and Au/SiO$_2$-25 platform.
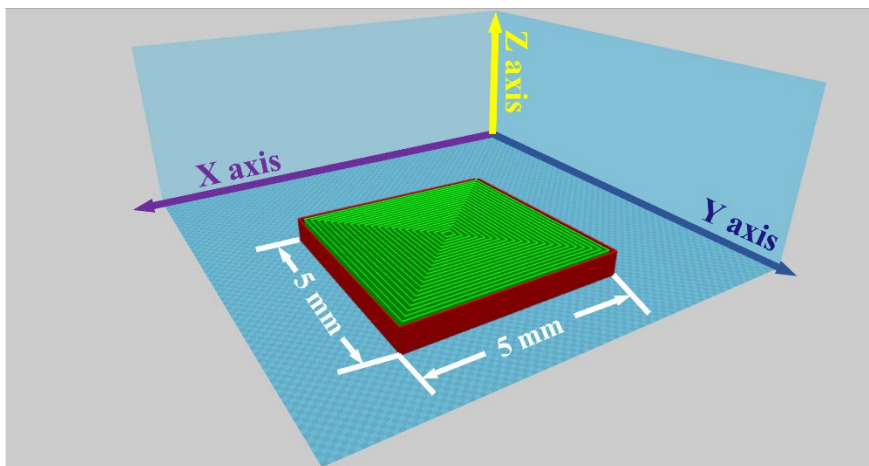
Fig. S8 The designed model for the microplasma printing of the AuNPs and Au/SiO$_2$ platforms.
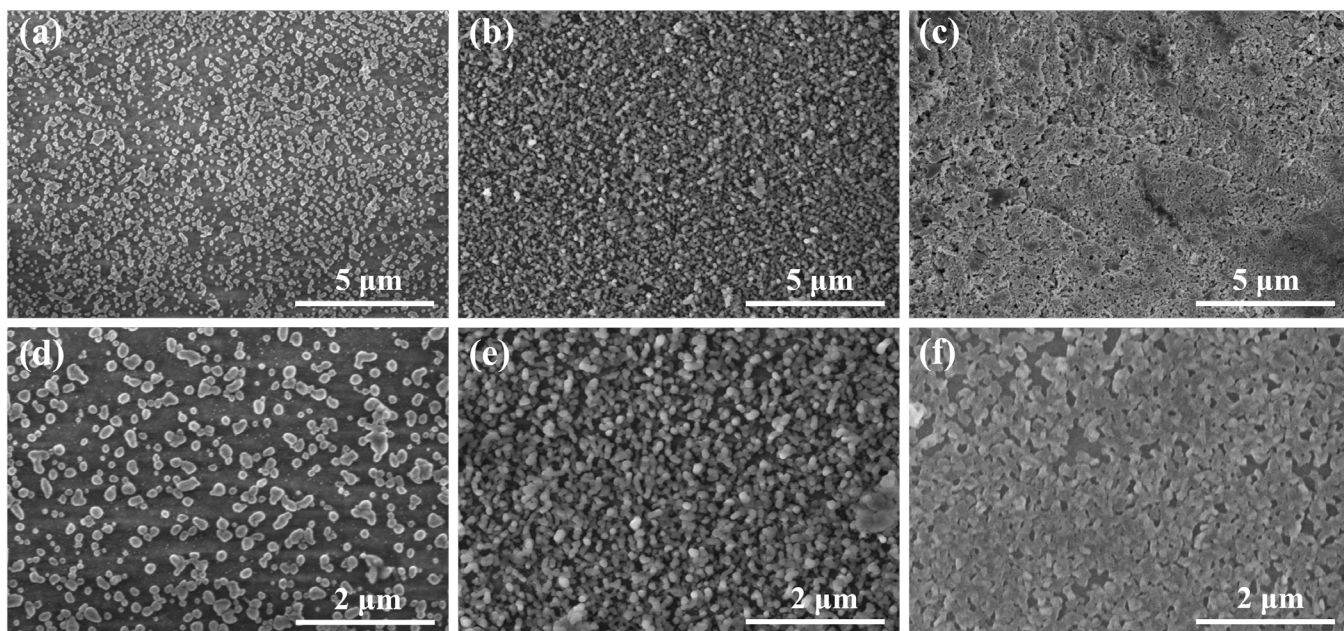
Fig. S9 (a-c) low magnitude SEM images of Au-based SERS platforms fabricated at condition 1-3: (a) AuNPs, (b) Au/SiO$_2$-25, and (c) Au/SiO$_2$-50 platform. (d-f) The corresponding high magnitude SEM images.
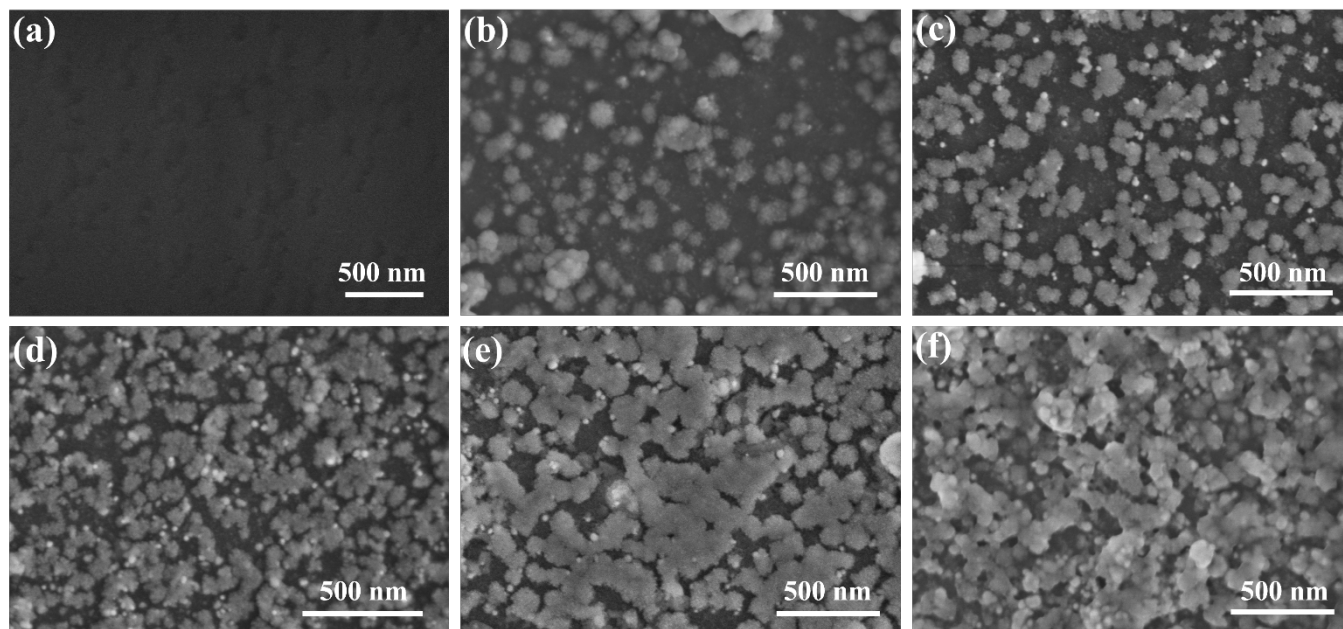
Fig. S10 SEM images of (a) the bare silicon wafer as well as the Au/SiO$_2$ platforms fabricated at different conditions: (b) condition 8; (c) condition 9; (d) condition 10; (e) condition 11; (f) condition 2.
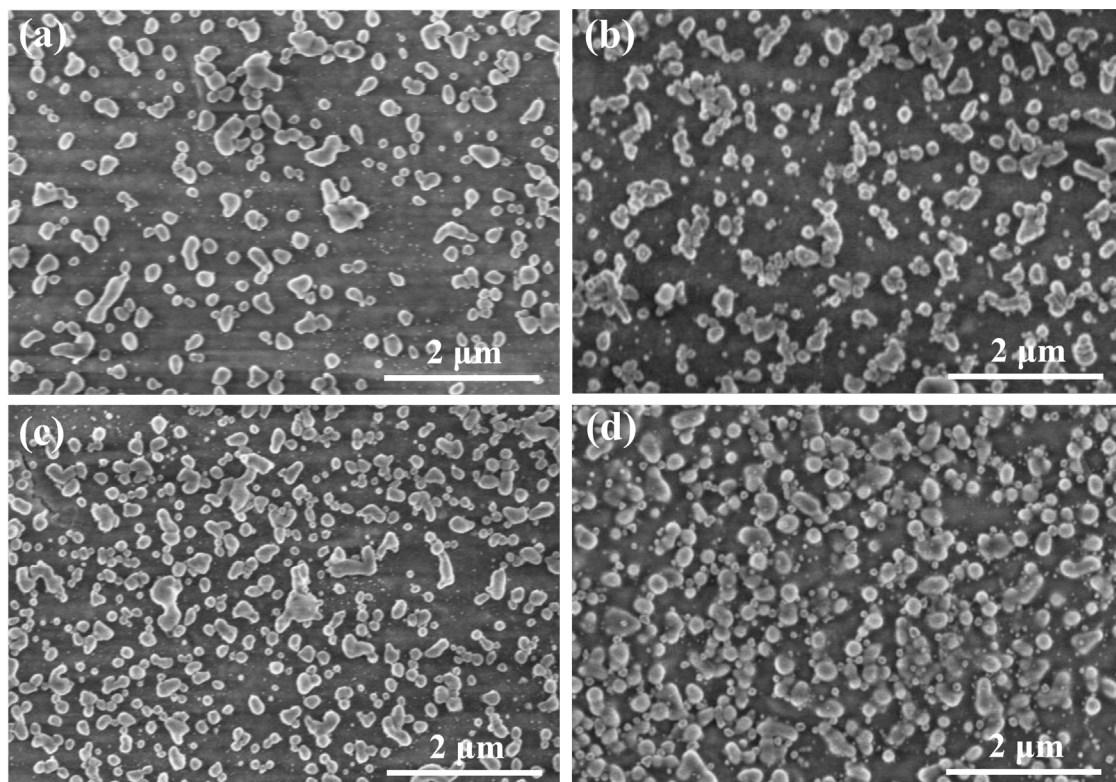
Fig. S11 SEM images of the AuNPs platforms fabricated at different $HAuCl_4$ concentrations: (a) 0.1 mM; (b) 0.5 mM; (c) 1.0 mM; (d) 1.5 mM.

Table S1 Operation parameters of the 3D printer for the fabrication of the SERS platforms.

Operation parameter	Value
Speed of the electrode	20 mm/s
X-axis accuracy	0.0011 mm
Y-axis accuracy	0.0011 mm
Z-axis accuracy	0.00125 mm
X-axis width of the platform	5 mm
Y-axis width of the platform	5 mm
Operation temperature	Room temperature
Pressure	Normal pressure