Ag-nanoplates decorated cavity-nanorod array SERS substrate for trace detection of PCB-77

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Table S1 Orthogonal test of MACE

Factor / Sequence	Concentration of $AgNO_3$ （mol • L^{-1}）	Deposition Time （min）	Etching Time （min）
1	5.0×10^{-3}	2	3
2	5.0×10^{-3}	3	4
3	5.0×10^{-3}	4	5
4	7.5×10^{-3}	2	4
5	7.5×10^{-3}	3	5
6	7.5×10^{-3}	4	3
7	10×10^{-3}	2	5
8	10×10^{-3}	3	3
9	10×10^{-3}	4	4

Table S2 Analyze orthogonal test

Project	Level	Concentration of $AgNO_3$ （$mol \cdot L^{-1}$）	Deposition Time （min）	Etching Time （min）
K	1	24951.06	-	-
	2	14175.97	-	13789.19
	3	15619.81	19333.31	22576.27
	4	-	18135.31	18381.37
	5	-	17278.22	-
K_{avg}	1	8317.02	-	-
	2	4725.32	-	4596.4
	3	5206.6	6444.44	7525.42
	4	-	6045.1	6127.12
	5	-	5759.41	-
The best level		1	3	3
R		3591.7	685.03	2929.03
Quantity		3	3	3
Repeats		3	3	3

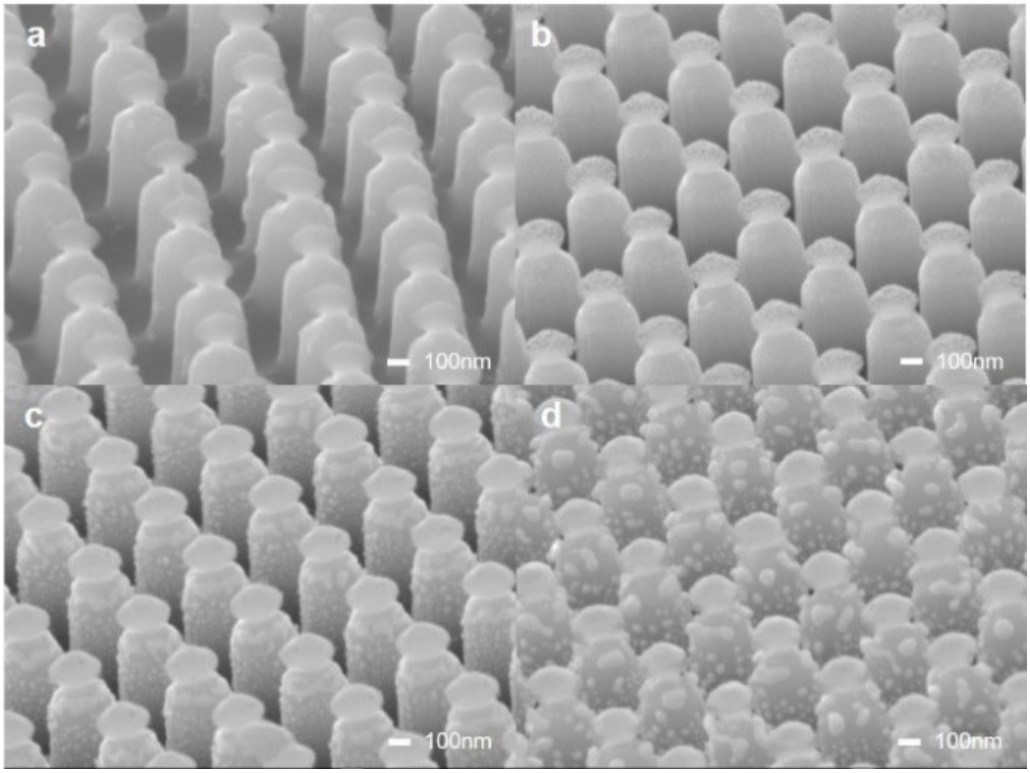

Figure S1 SEM images of sputtering (a) 0 nm, (b) 5 nm, (c) 10 nm, (d) 15nm Au on nanorod substrate.

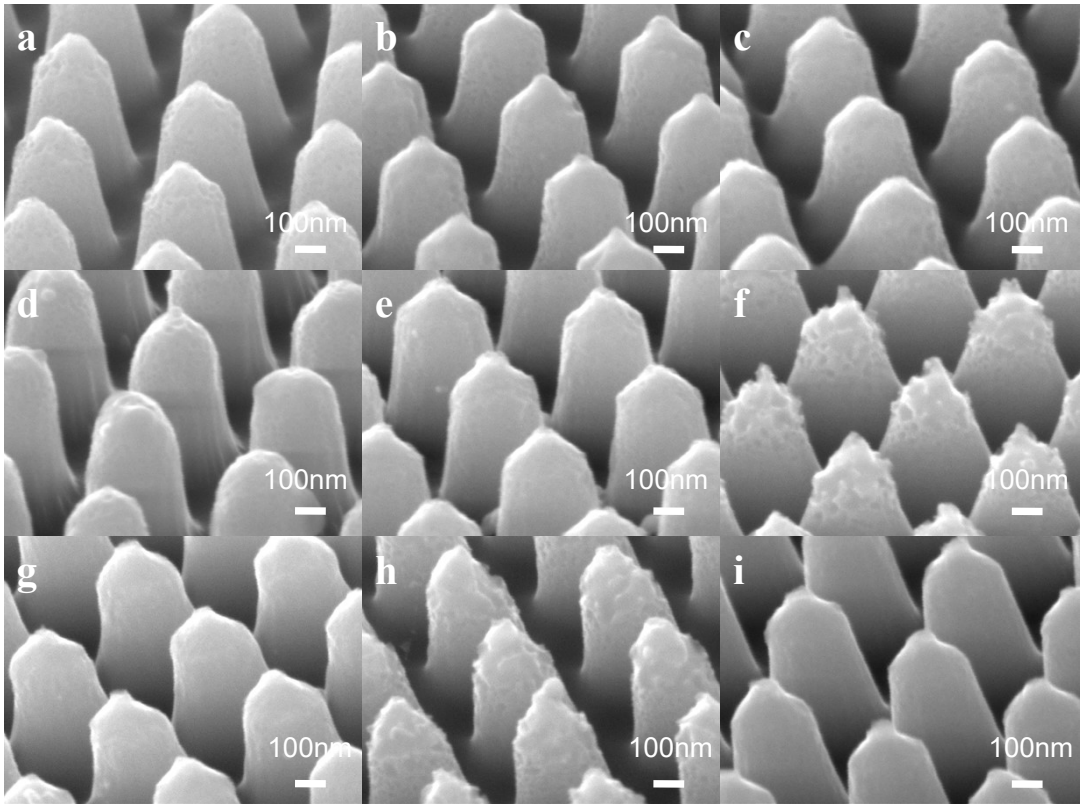

Figure S2 SEM images of substrate (a)~(i) No.1~9 in orthogonal test.

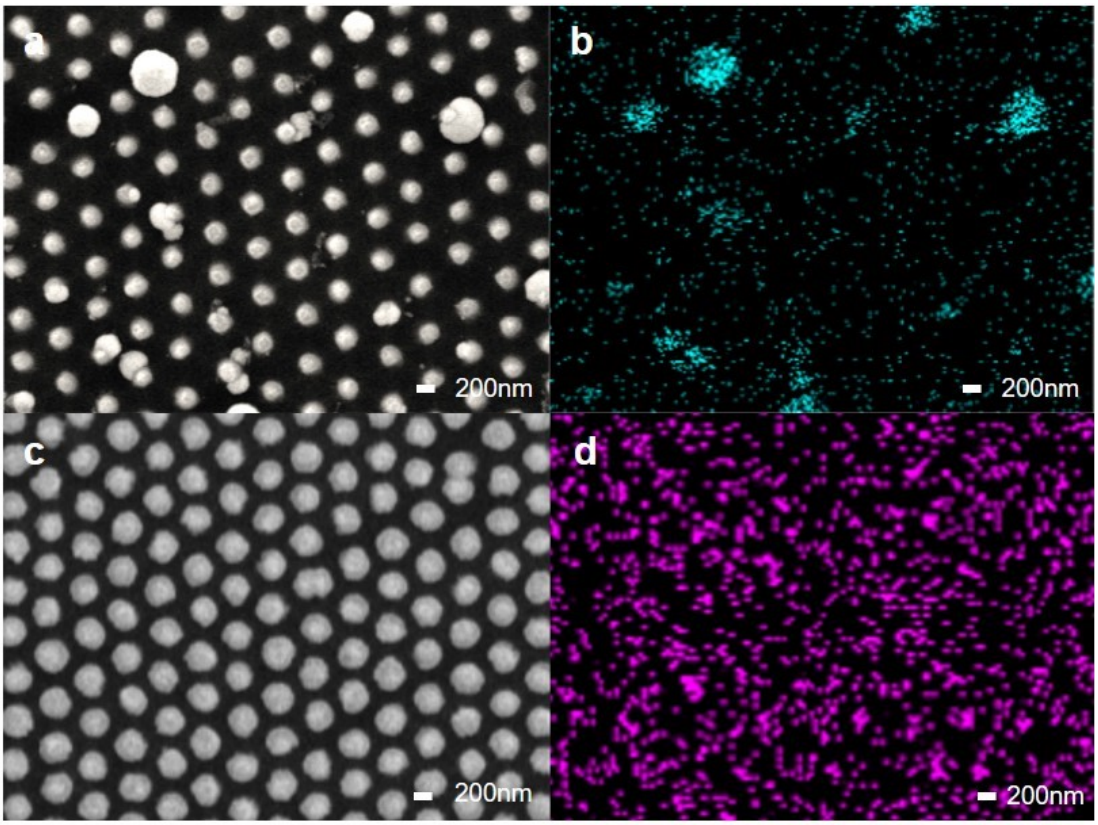

Figure S3 The substrate without gold seeds was deposited in galvanic cell at 10min: (a) SEM image, (b) Ag in EDS mapping; the substrate with gold seeds was deposited in galvanic cell at 10min: (c) SEM image, (d) Ag in EDS mapping.

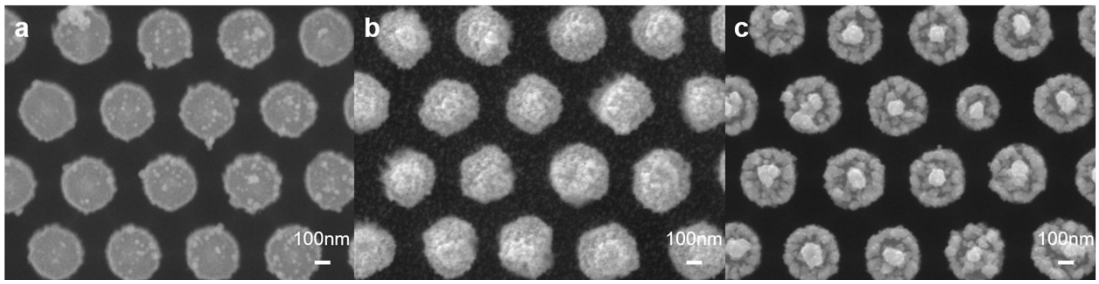

Figure S4 SEM images of No.8 substrates deposit in galvanic cells for (a) 5 min, (b) 10 min, and (c) 15 min.

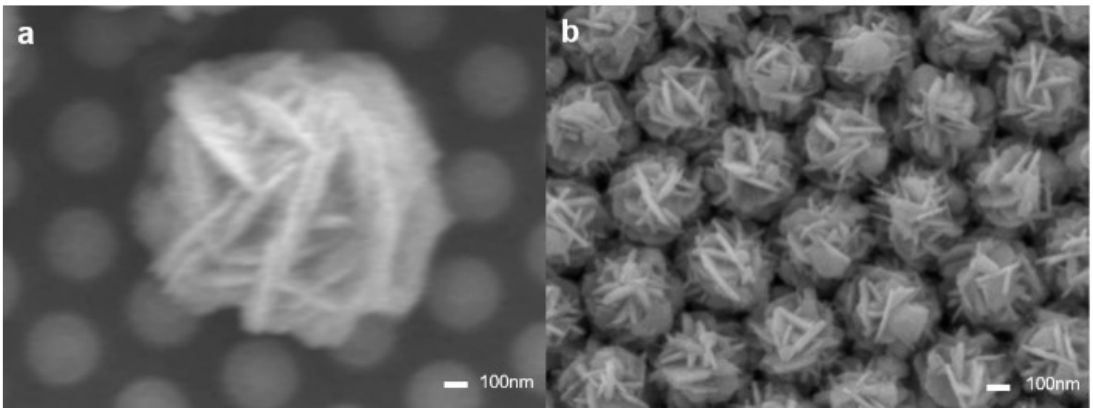

Figure S5 The gold-sputtered substrate and the nongold-sputtered substrate galvanic cells were deposited for 20min.

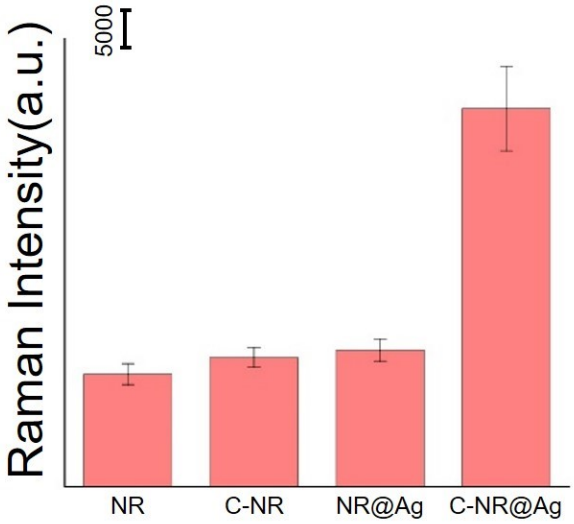

Figure S6 The performance of different substrates using the characteristic peak intensity of 611 cm^{-1} based on the Raman spectra. The error bar was calculated by three replicated determinations.

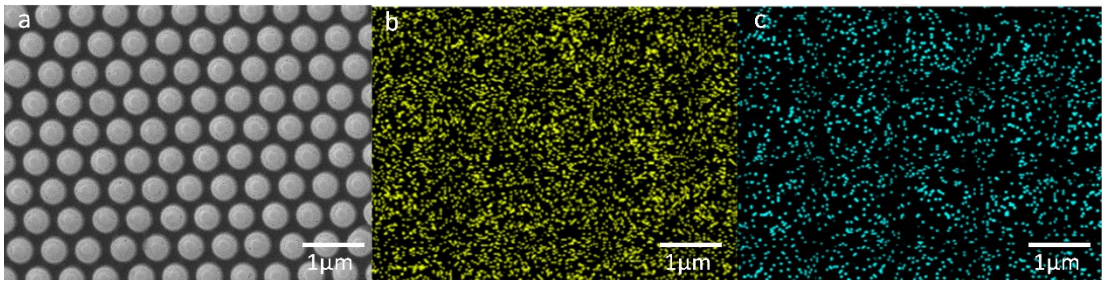

Figure S7 (a) SEM image of C-NR@Ag substrate. (b) EDS mapping results of Au on C-NR@Ag substrate based on a. (c) EDS mapping results of Ag on C-NR@Ag substrate based on a.

Table S3 EDS content analysis of various elements on the surface

element	Normalized quality (%)	Atom (%)
C	6.76	16.90
O	1.04	1.94
Si	71.94	76.88
Ag	9.44	2.63
Au	10.82	1.65
Total	100.00	100.00

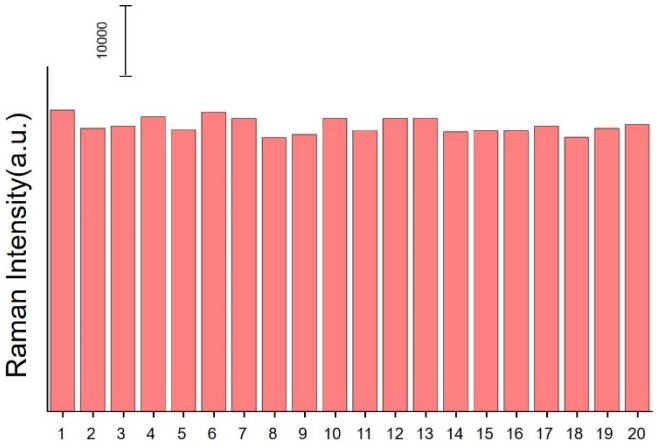

Figure S8 20 points of the peak intensity of 1078 cm^{-1}.

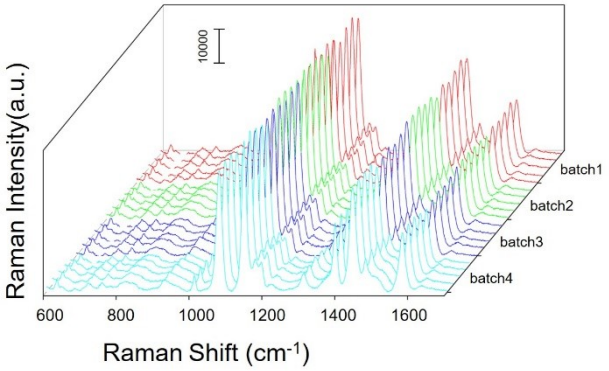

Figure S9 The Raman spectra of the substrate with four batches using 10^{-5} M p-ATP.

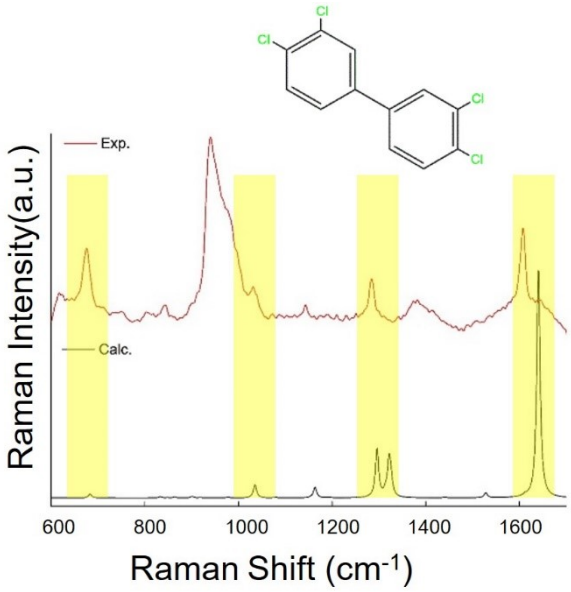

Figure S10 The Raman peak positions of the PCB-77 molecules from theoretical simulation from 650 cm-1 to 1650 cm^{-1}.

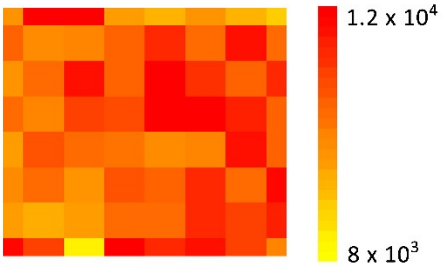

Figure S11 The uniformity of the substrate using the characteristic peak intensity of 1608 cm^{-1}.