Electronic Supporting Information (ESI)

PEGylated Nanographene–mediated Metallic Nanoparticle Clusters for Surface Enhanced Raman Scattering–based Biosensing

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Experimental part

Calculation of enhancement factor of the PNG-AuNPCs

The enhancement factor of the PNG-AuNPCs was determined as reported previously [1]. Raman and SERS spectra were collected under an exposure time of 10 seconds at output power of 12.5 mW while all conditions being kept identical. Normal Raman intensity (I_{NR}) was recorded using 0.1 M concentrated solution of MP. On the other hand, SERS intensity (I_{SERS}) was recorded using the PNG-AuNPCs with the lowest concentration of 1.20×10^{-11}M of MP. The characteristic peak at 1096 cm^{-1} was used to measure both I_{NR} and I_{SERS}. Enhancement factor was determined by relating the SERS signal intensity (I_{SERS}) and normal Raman intensity (I_{NR}), with regard to their corresponding concentrations of MP used for SERS (C_{SERS}) and normal Raman (C_{NR}) recordings by using the equation.

$$EF = \frac{I_{SERS}}{I_{NR}} \times \frac{C_{NR}}{C_{SERS}}$$

Table S1. Calculation of enhancement factor of the PNG-AuNPCs

C_{SERS}	I_{SERS}	C_{NR}	I_{NR}	EF
1.20 x 10^{-11} M	315	0.1 M	19.5	1.34 $_X$ 10^{11}

Table S2. ζ potential values of AuNPs, AuNPs with MP, AuNP with MP and PyMA, and PNG-AuNPCs using five different batches (N = 5).

Sample	ζ potential (± SD) (mV)
AuNPs	-34.6 ±0.5
AuNPs with MP	-33.5 ±0.9
AuNP with MP and PyMA	-27.5 ±1.5
PNG-AuNPCs	-26.2 ±1.6

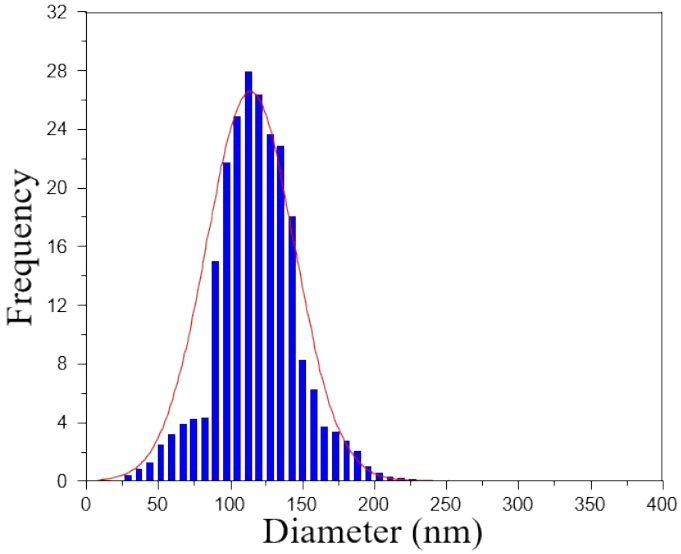

Figure S1. Size distribution profile of PNG-AuNPCs that indicates the approximately normal distribution. The profile was calculated with 35 objects of TEM images using ImageJ software.

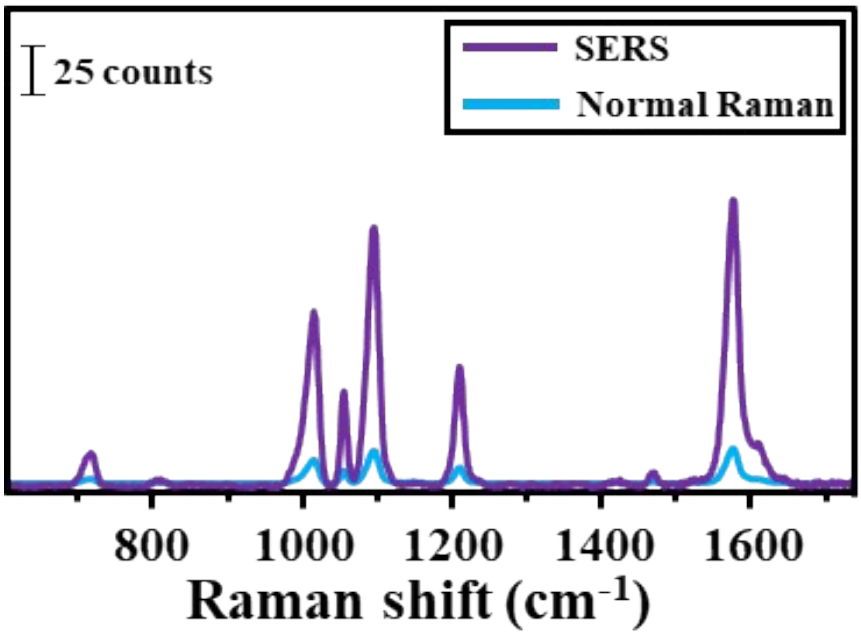

Figure S2. Normal Raman and SERS spectra of MP used for determination of enhancement factor of the PNG-AuNPCs.

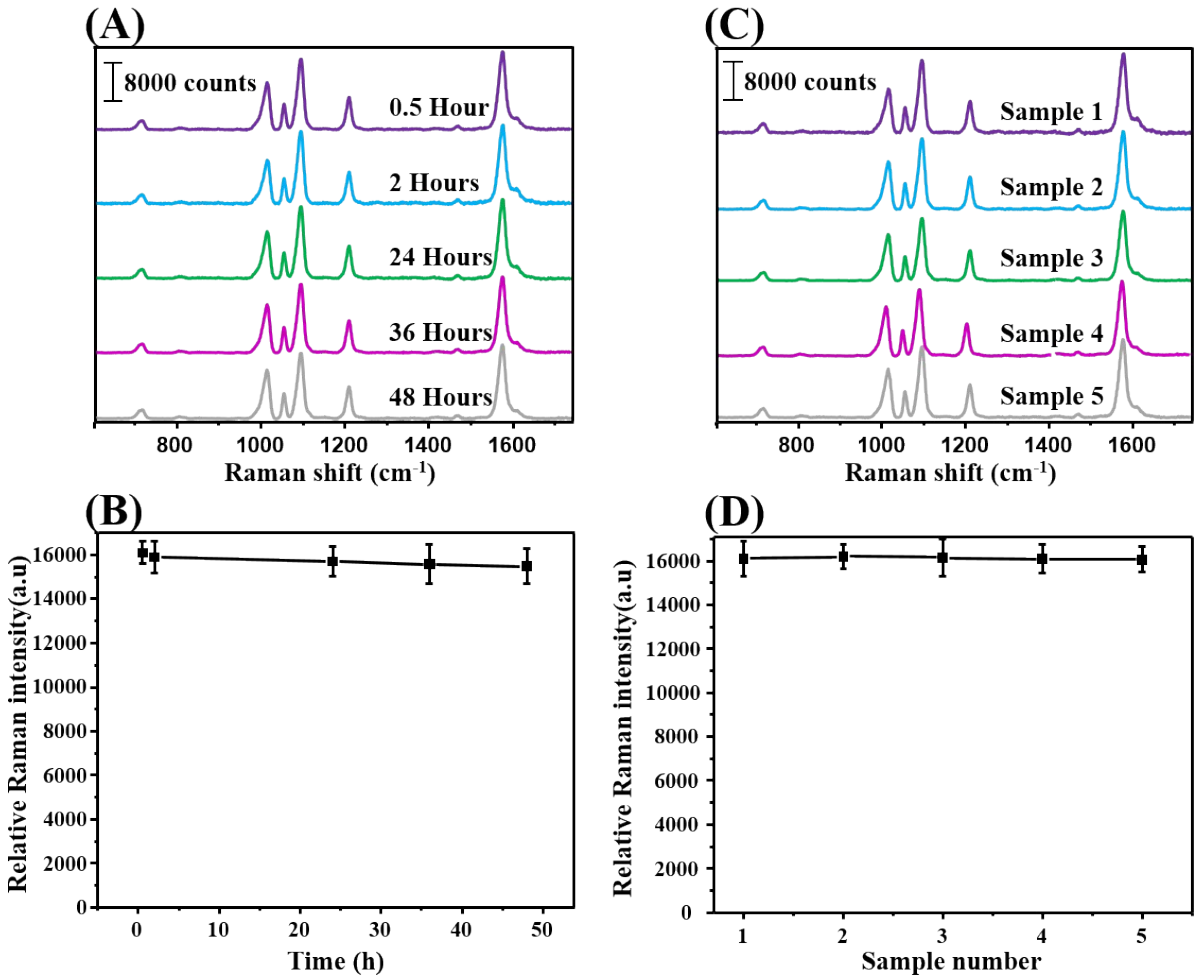

Figure S3. (A, C) SERS spectra and (B, D) SERS intensities at 1096 cm^{-1} of the PNG-AuNPCs as a function of incubation time (A, B) and (C, D) batch-to-batch variability of SERS signals of the PNG-AuNPCs in in PBS buffer at pH 7.4 (*N*=5).

Reference

1. L. Zheng, H. Mao, L. Zhang, Y. Jin, Y. Zhou, Y. Peng and S. Du, *Analytical Methods*, 2014, **6**, 5925-5933.