Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Controllable Fabrication of Metallic Photonic Crystals for Ultra-Sensitive SERS and Photodetector

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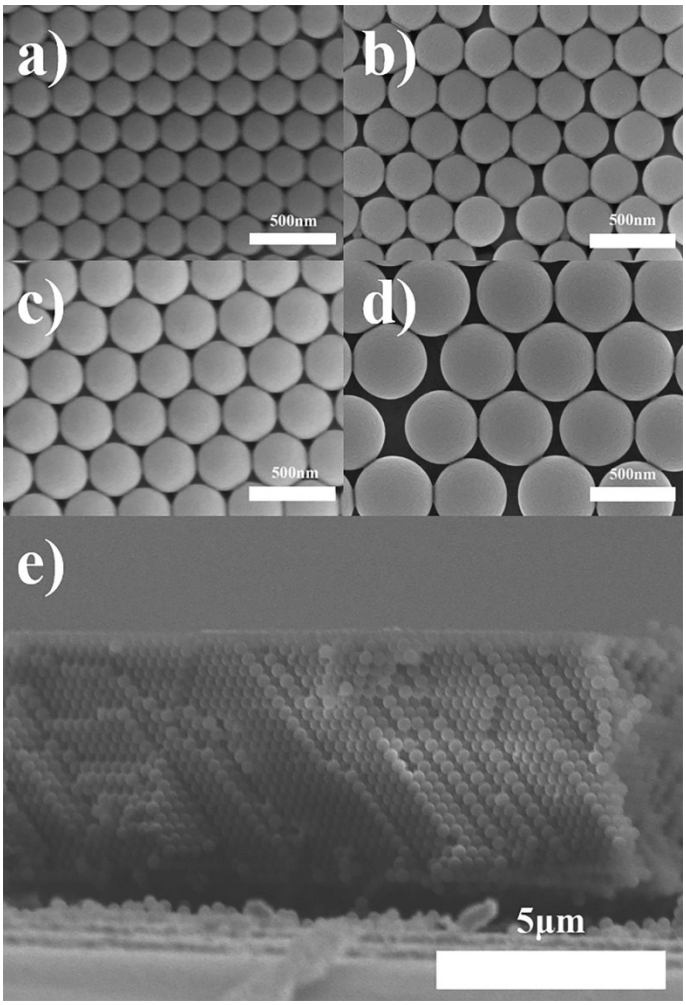

Figure S1. (a-e) SEM images of fabricated PS colloidal crystals templates on FTO glass slides after self-assembly, (a) 200 nm; (b) 300 nm; (c) 370 nm; (d) 450 nm; (e) top-view SEM image of PS template with diameter of 300nm.

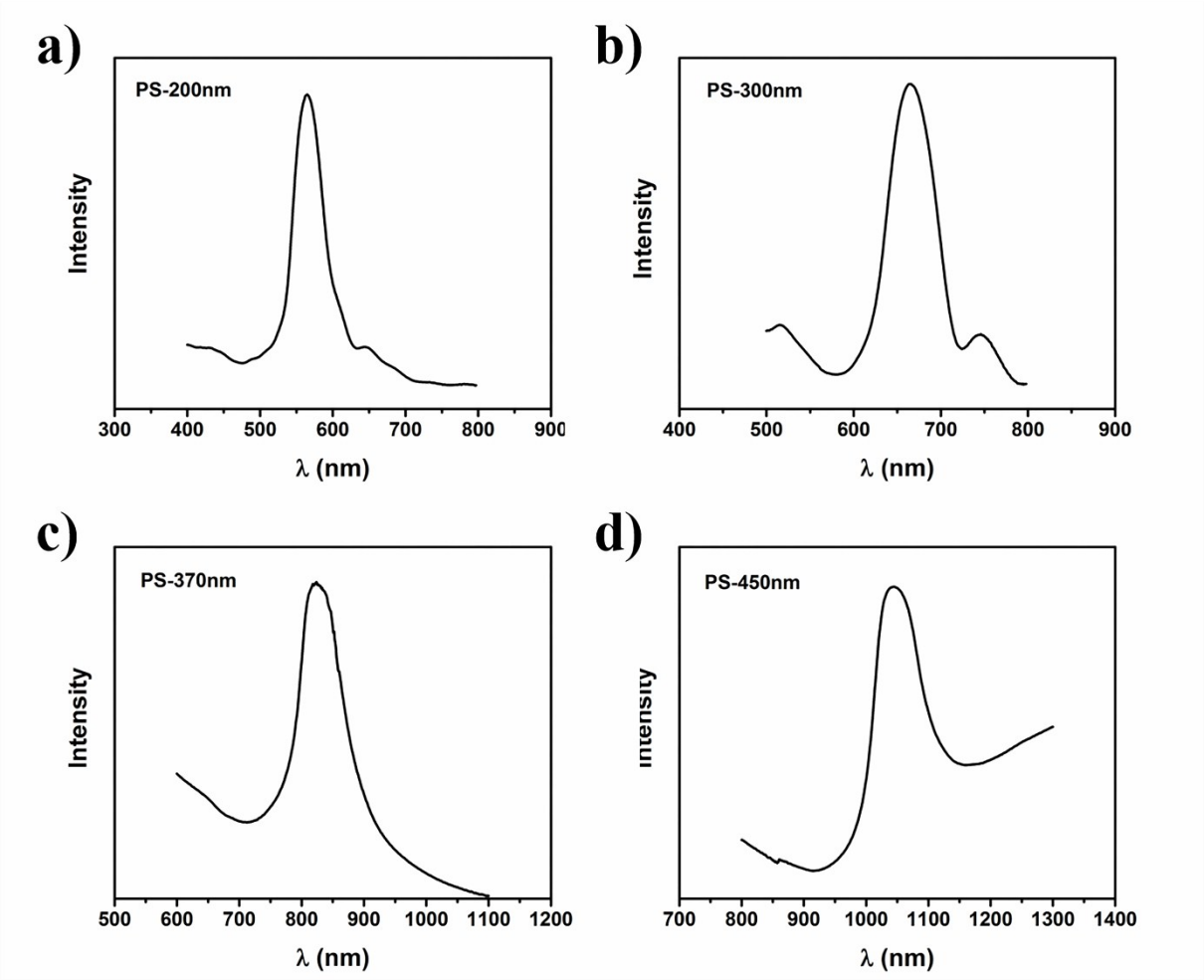

Figure S2. (a-d) Reflection spectra of PS colloidal crystals templates on FTO glass slides, (a) 200 nm; (b) 300 nm; (c) 370 nm; (d) 450 nm.

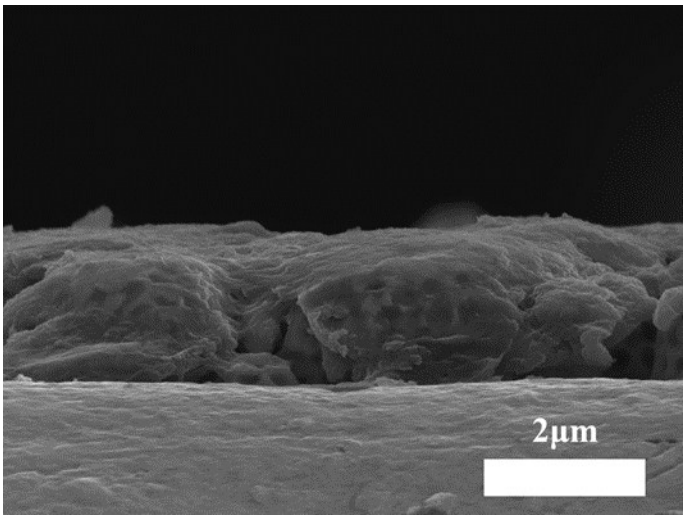

Figure S3. Cross-sectional view SEM image of Ag MPCs with diameter of 370nm.

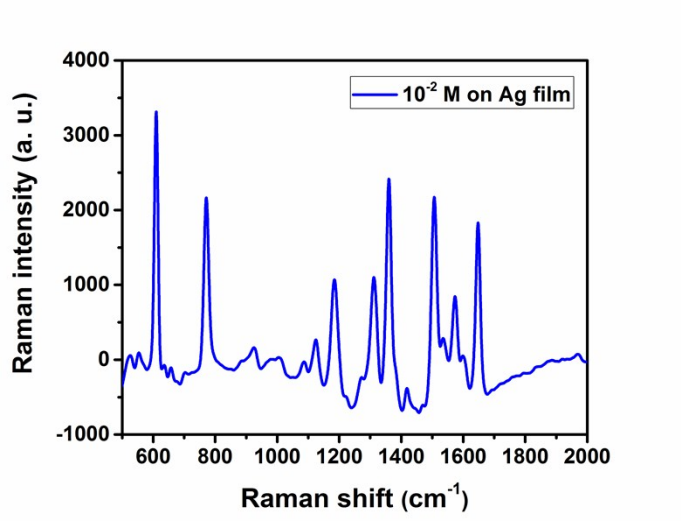

Figure S4. Raman spectrum of 10^{-2} M R6G collected from a normal Ag film substrate on FTO glass slides.

Table S1. A comparison between Metallic Inverse opal and recently reported noble-metal nanostructures in terms of the SERS enhancement factor of R6G.

Current results	Structure	EF
This work	Metallic Inverse Opal	4.8×10^{9}
ACS Nano, 2011[1]	Metallo-Dielectric Photonic Crystals	0.76×10^{8}
ACS Nano, 2017[2]	Au-Functionalized Si Nanorod Arrays	3.3×10^{7}
ACS. Appl. Mater. Inter, 2012[3]	Au/SiO_2 Nanocomposites	5.4×10^{8}
Chem. Commun.,2011[4]	Gold Nanoparticles	5.8×10^{7}

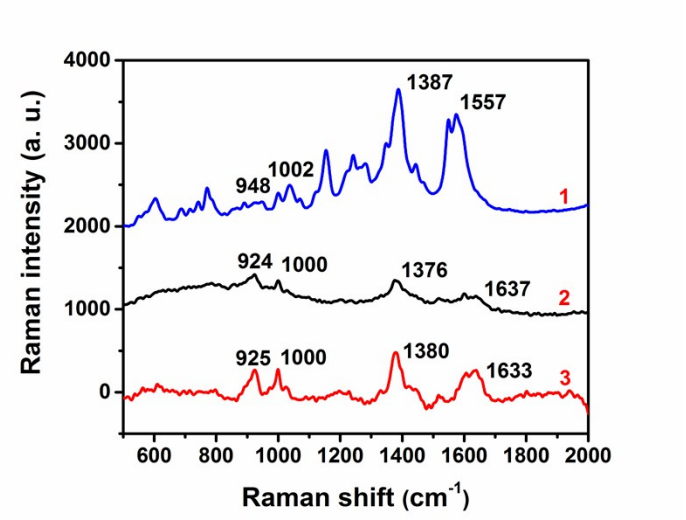

Figure S5. Raman spectra of 10^{-13} M R6G collected from one Ag-200nm sample where three different positions were chosen randomly for measurement.

Table S2. Detailed electrodeposition solutions and corresponding reaction conditions.

Materials	Deposition solutions	*t* (min)	*T* (°C)	Potential (V) or current density (mA/cm^{-2})
Ag	Silver nitrate (1.7g), EDTA (3.7g), boric acid (0.06g), potassium nitrate (1g), ammonium hydroxide, PH=9~10, deionized water (100ml)	5min	25°C	2.5 mA/cm^{-2}
Cu	Copper sulfate (4g), trisodium citrate (4.7g), glucose (0.36g), SDS (0.02g), 4mol/L, sodium hydroxide (0.5g), deionized water (100ml)	5min	25°C	3.5 mA/cm^{-2}
Ni	Nickel sulfate (30g), nickel chloride (4.5g), boric acid (4g), glucose (1g), SDS (0.02g), deionized water (100ml)	10min	25°C	-0.90V
Co	Cobalt sulfate (30g), cobalt chloride (4.5g), boric acid (4g), glucose (1g), SDS (0.02g), deionized water (100ml)	10min	25°C	-0.95V

Reference

1 Y. Zhao, X.-J. Zhang, J. Ye, L.-M. Chen, S.-P. Lau, W.-J. Zhang and S.-T. Lee, *ACS nano*, 2011, **5**, 3027-3033.

2 D. Lin, Z. Wu, S. Li, W. Zhao, C. Ma, J. Wang, Z. Jiang, Z. Zhong, Y. Zheng and X. Yang, *ACS nano*, 2017, **11**, 1478-1487.

3 C. C. Chang, K. H. Yang, Y. C. Liu, T. C. Hsu and F. D. Mai, *ACS Appl. Mater. Inter.*, 2012, **4**, 4700-4707.

4 F. D. Mai, T. C. Hsu, Y. C. Liu, K. H. Yang and B. C. Chen, *Chem. Commun.*, 2011, **47**, 2958-2960.