A Robust site-specific Au@SiO_2@AgPt nanorod/nanodots superstructure for in-situ SERS monitoring catalytic reaction

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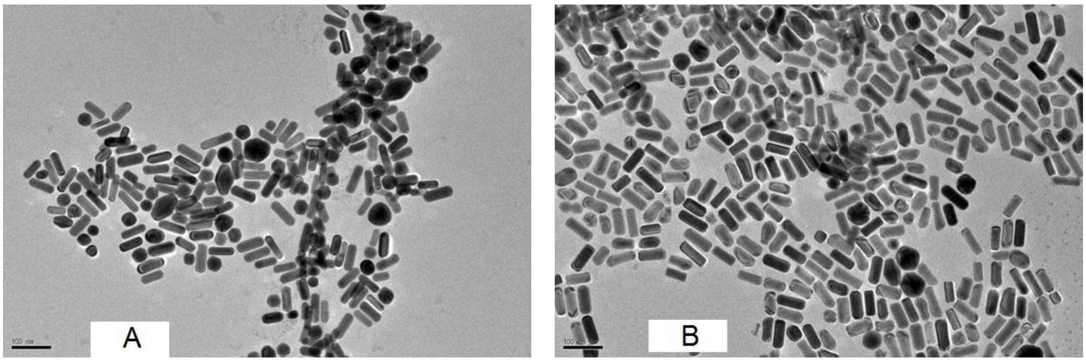


Fig. S1 TEM of $Au@SiO_2$ nanorods (A); $Au@SiO_2@Ag$ nanorods (B)

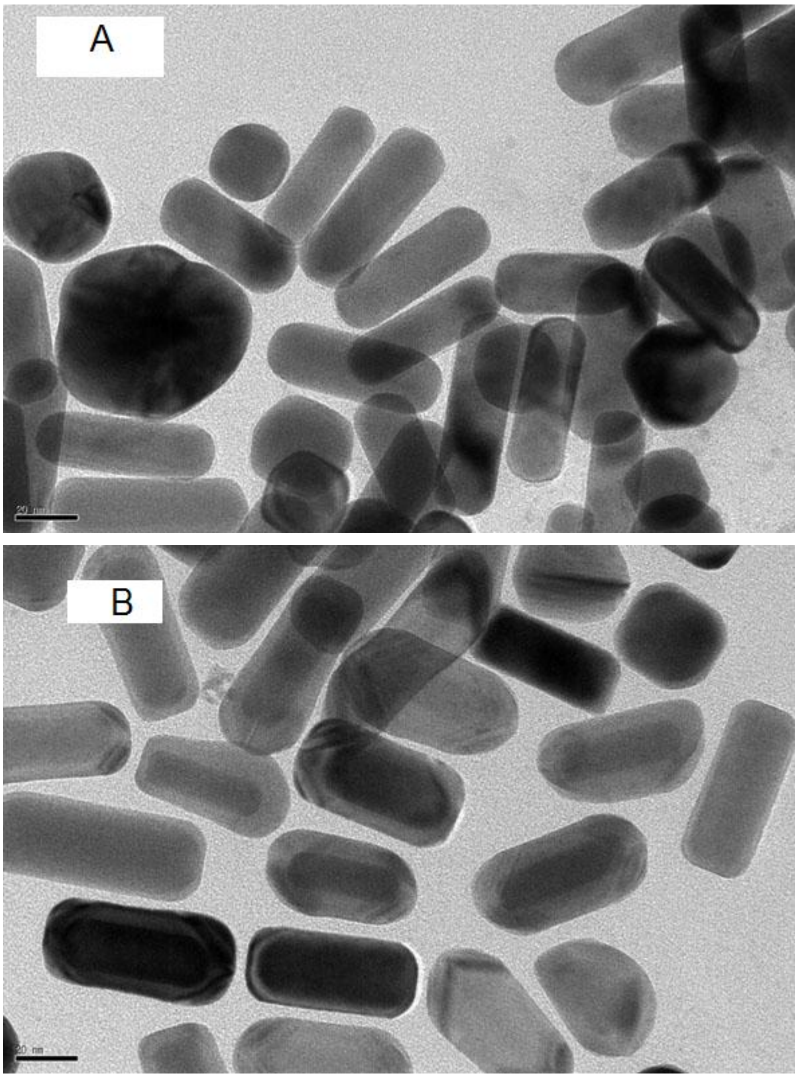


Fig. S2 Magnified image of TEM of $Au@SiO_2$ nanorods (A); $Au@SiO_2@Ag$ nanorods (B)

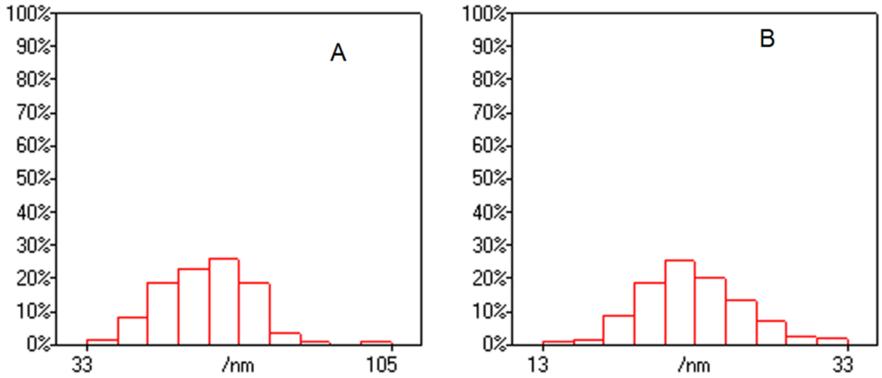


Fig. S3 (A) The histogram of edge length of $Au@SiO_2$ nanorods (corresponding to Fig. S1A), the average edge length is 61.15±10.46 nm. (B) The histogram of width of $Au@SiO_2$ nanorods (corresponding to Fig. S1A), the average width is 22.87±3.34 nm

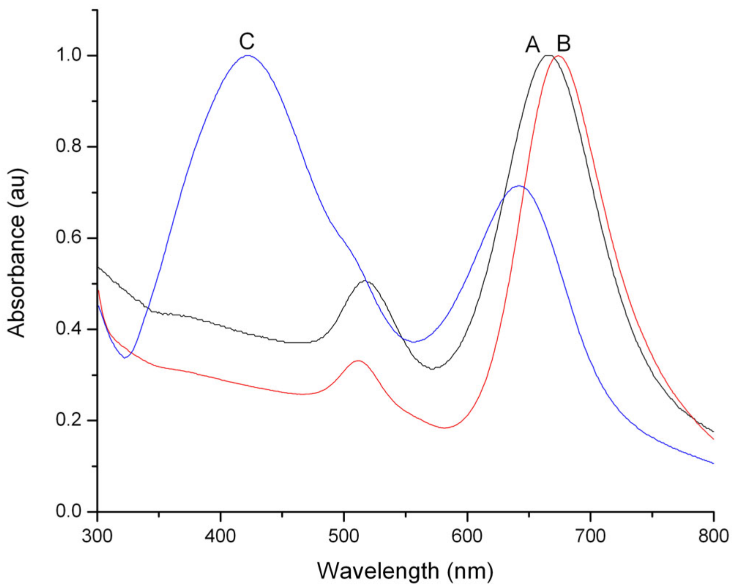


Fig. S4 UV-vis-NIR spectrum of Au nanorods (A); $Au@SiO_2$ nanorods (B); $Au@SiO_2@Ag$ nanorods (C)

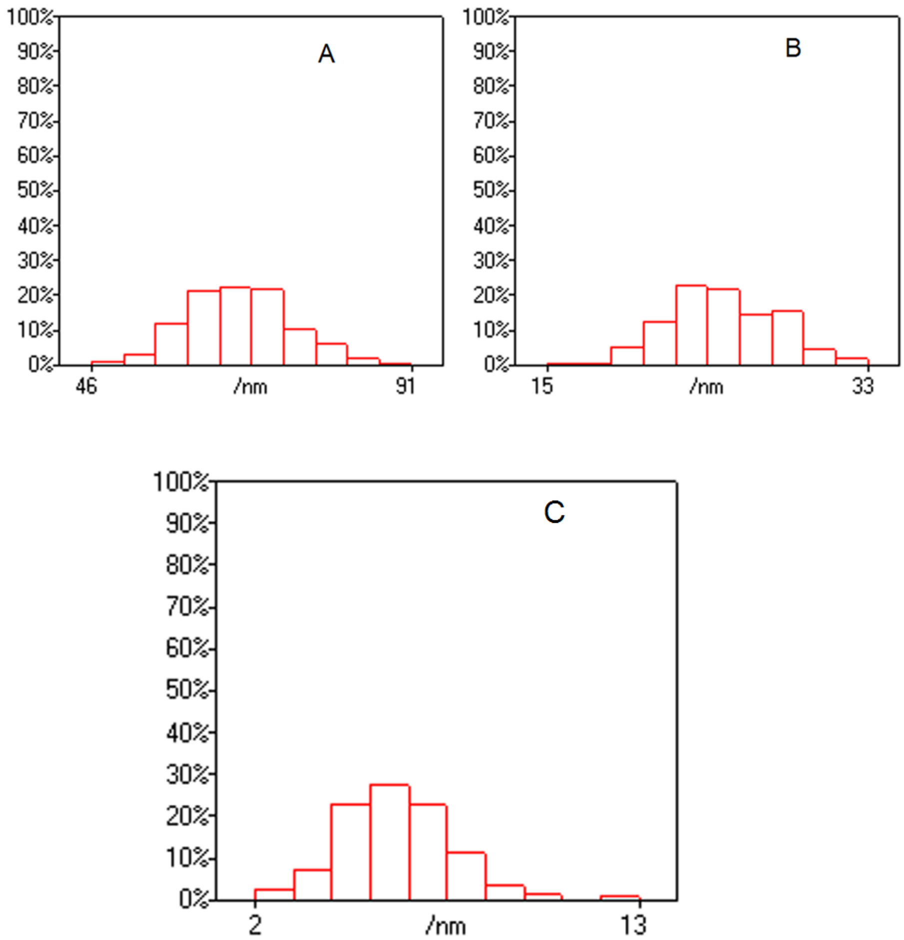


Fig. S5 (A) The histogram of edge length of Au@SiO_2@Ag nanorods (corresponding to Figure S1B), the average edge length is 66.78±7.29 nm. (B) The histogram of width of Au@SiO_2@Ag nanorods (corresponding to Figure S1B), the average width is 24.93±3.01 nm. (C) The histogram of thickness of Au@SiO_2@Ag nanorods (corresponding to Figure S1B), the average thickness of 6.08±1.62nm.

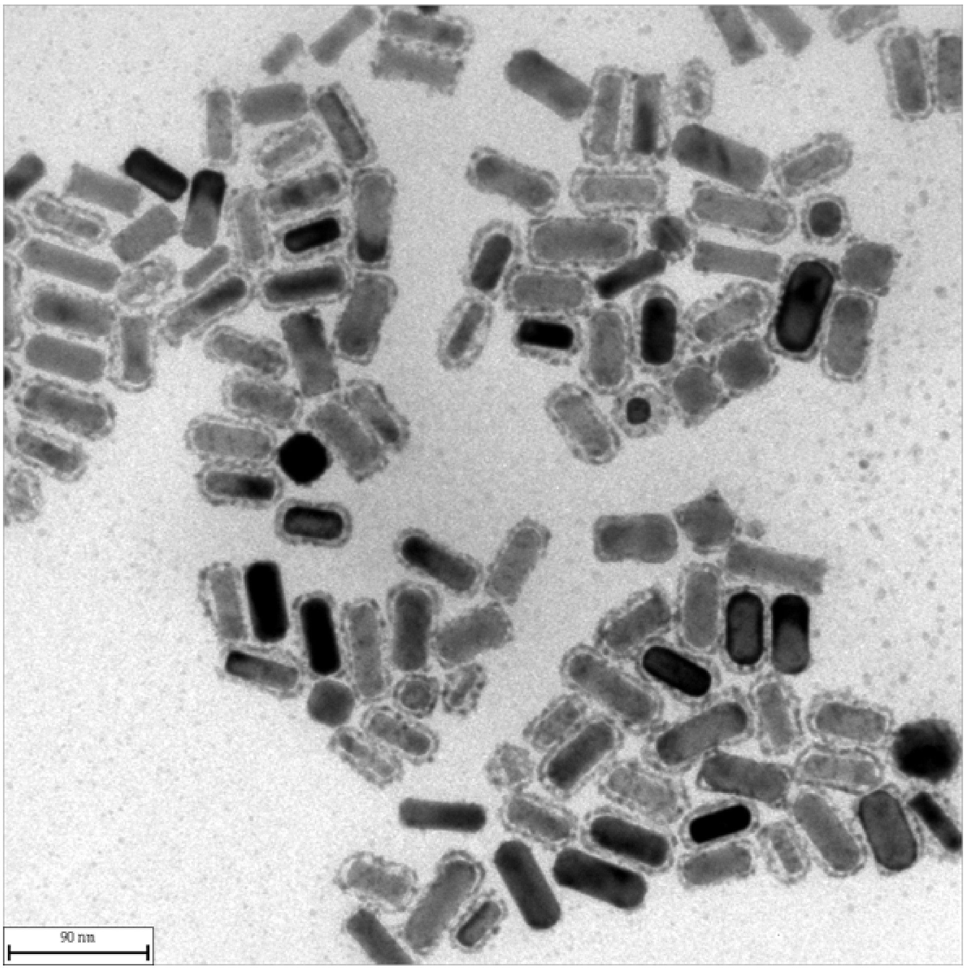
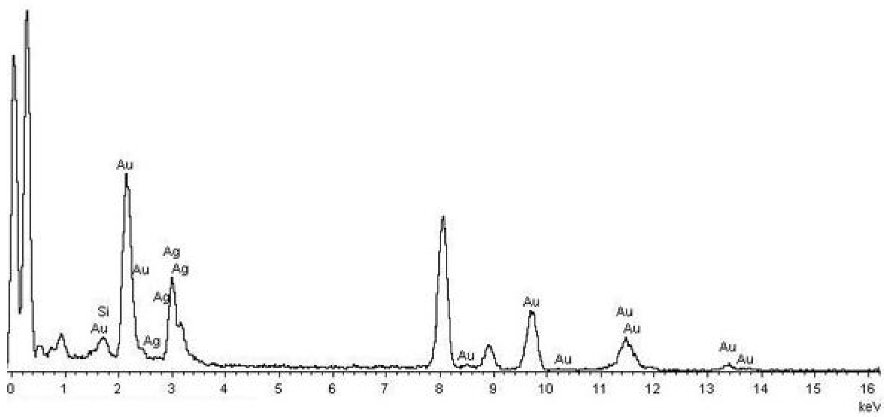
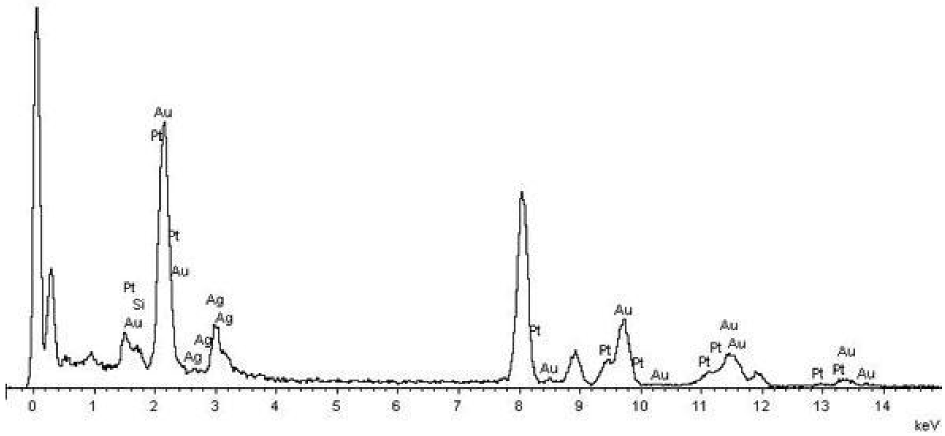


Fig. S6 Low magnification and large field view of the TEM images of tip-edge coated Au@SiO_2@AgPt nanorod/nanodots superstructure.



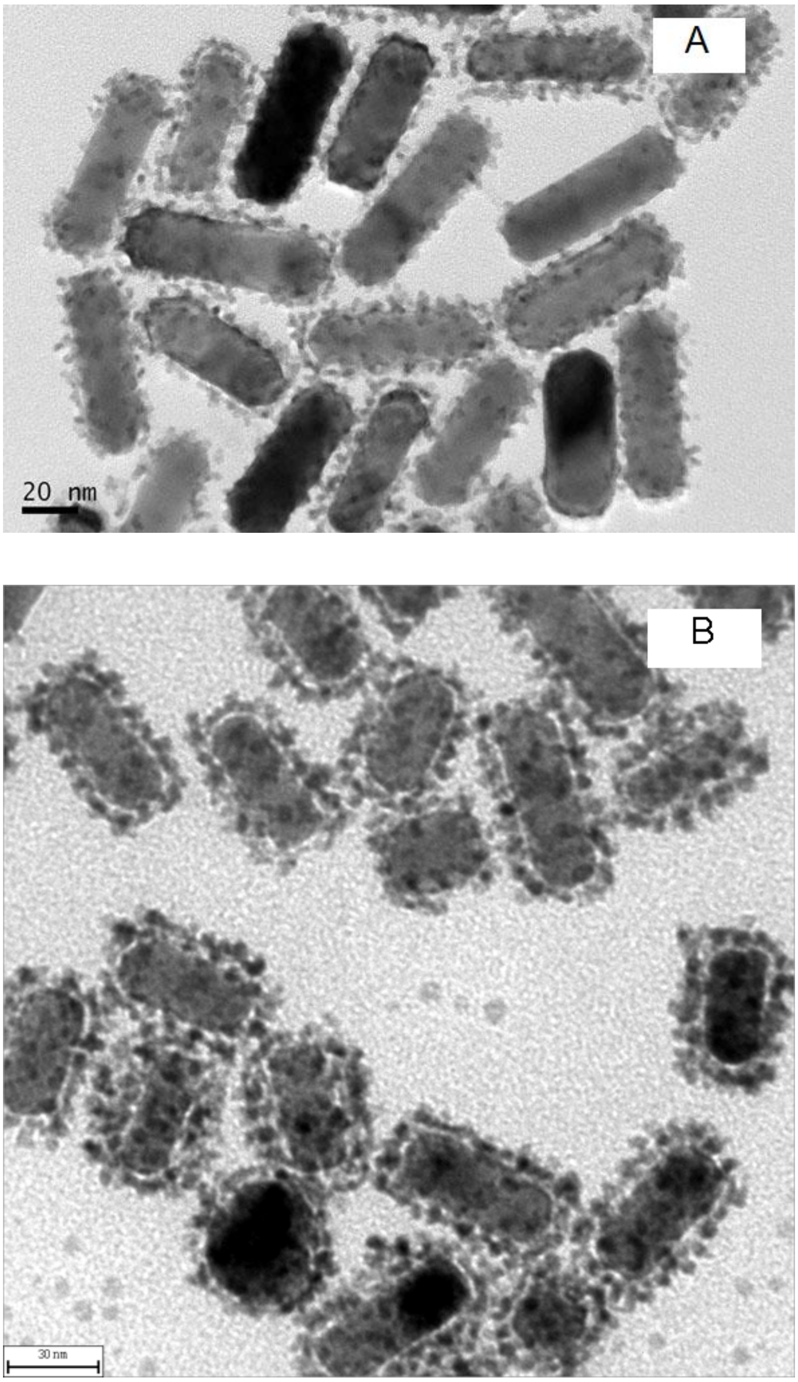
Element	Peak Area	Area Sigma	k factor	Abs Corrn.	Weight%	Weight% Sigma	Atomic%
Si K	606	110	0.732	1.150	1.66	0.30	8.31
Ag L	7943	306	1.262	1.127	36.86	1.04	47.92
Au M	14499	335	1.194	1.089	61.48	1.05	43.78
Totals					100.00		

Fig. S7 The EDX percentage of Au@SiO_2@Ag core-shell nanorods



Element	Peak Area	Area Sigma	k factor	Abs Corrn.	Weight%	Weight% Sigma	Atomic%
Si K	620	121	0.732	1.143	1.65	0.32	9.16
Ag L	4242	261	1.262	1.154	19.63	1.07	28.39
Pt M	3779	362	1.190	1.095	15.65	1.30	12.51
Au M	15186	393	1.194	1.095	63.06	1.37	49.94
Totals					100.00		

Fig. S8 The EDX percentage of core-satellite Au@SiO_2@AgPt nanorod/nanodots superstructure


A
20 nm
B
30 nm

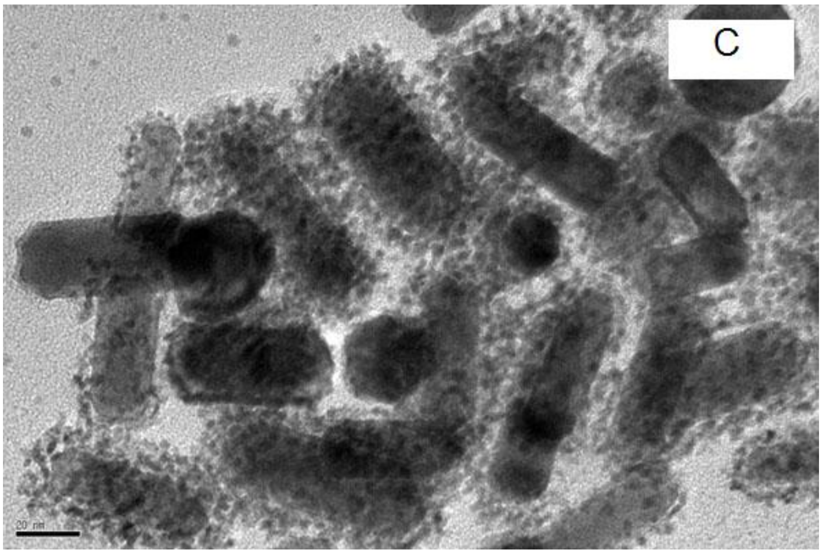


Fig. S9 TEM of Au@SiO$_2$@AgPt nanorods/nanodots superstructure with different amounts of AgNO$_3$ (A) 0.5 mL 4mM; (B) 1 mL 4mM; (C) 1.5 mL 4mM and identical 38.6 mM H$_2$PtCl$_6$ 1 mL.

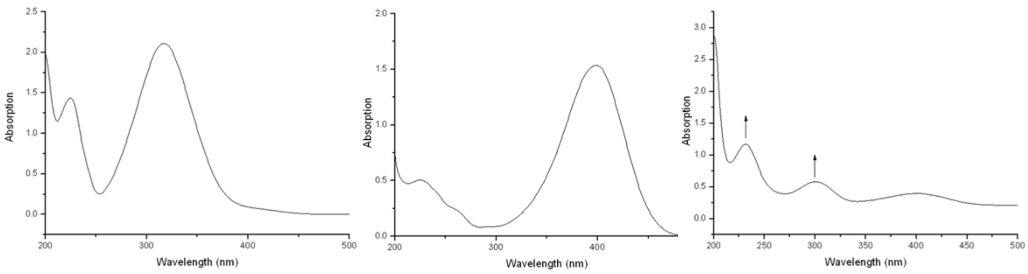
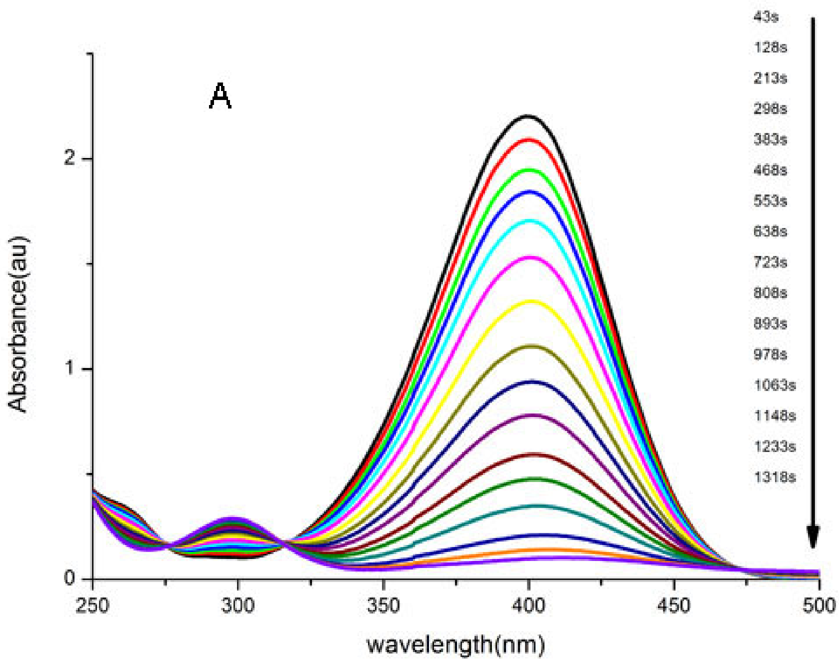


Fig. S10 UV-Vis spectrum of 4-nitrophenol (left); UV-Vis spectrum of p-nitrophenolate anions when NaBH$_4$ is added to 4-nitrophenol (middle); UV-Vis spectrum of p-aminophenolate anions when nanorods/nanodots are added to the mixture of NaBH$_4$ and p-nitrophenol (right)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128s
213s
298s
383s
468s
553s
638s
723s
808s
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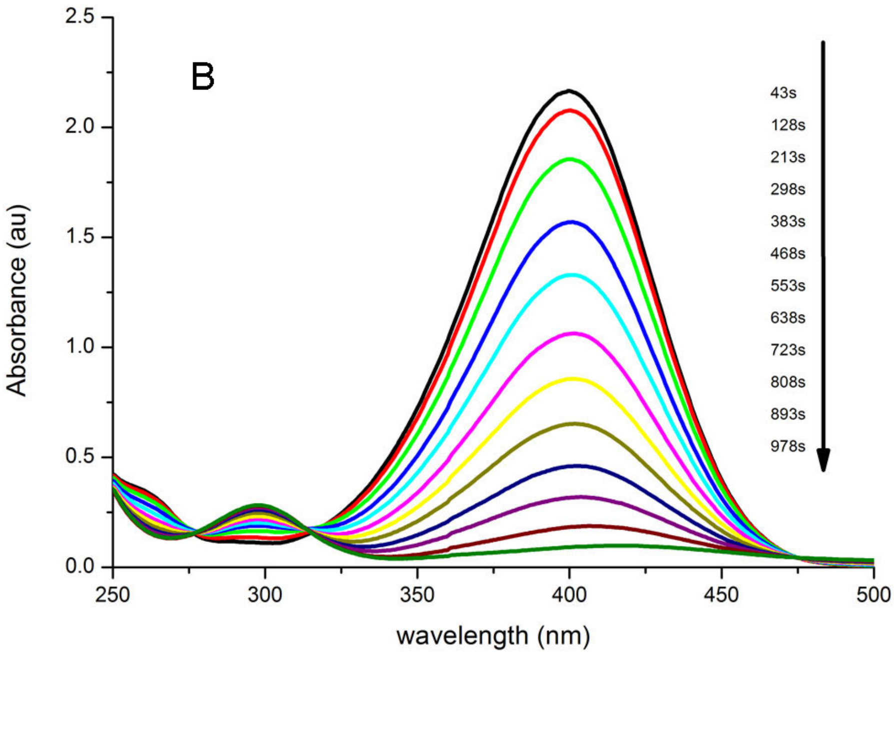
978s
1063s
1148s
1233s
1318s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Absorbance (au)
wavelength (nm)
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383s
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638s
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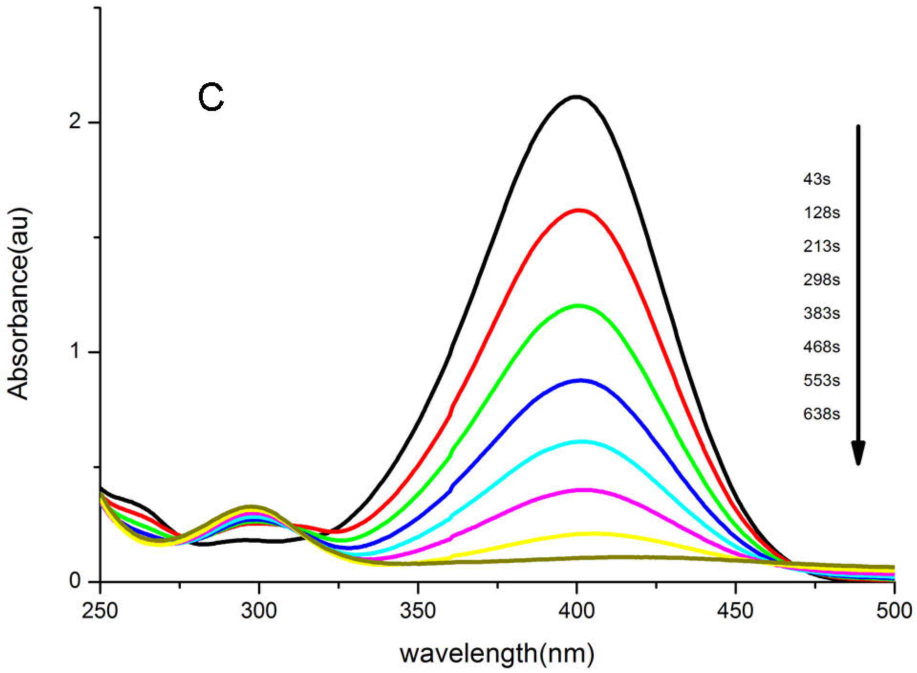
893s
978s



C
Absorbance(au)
wavelength(nm)
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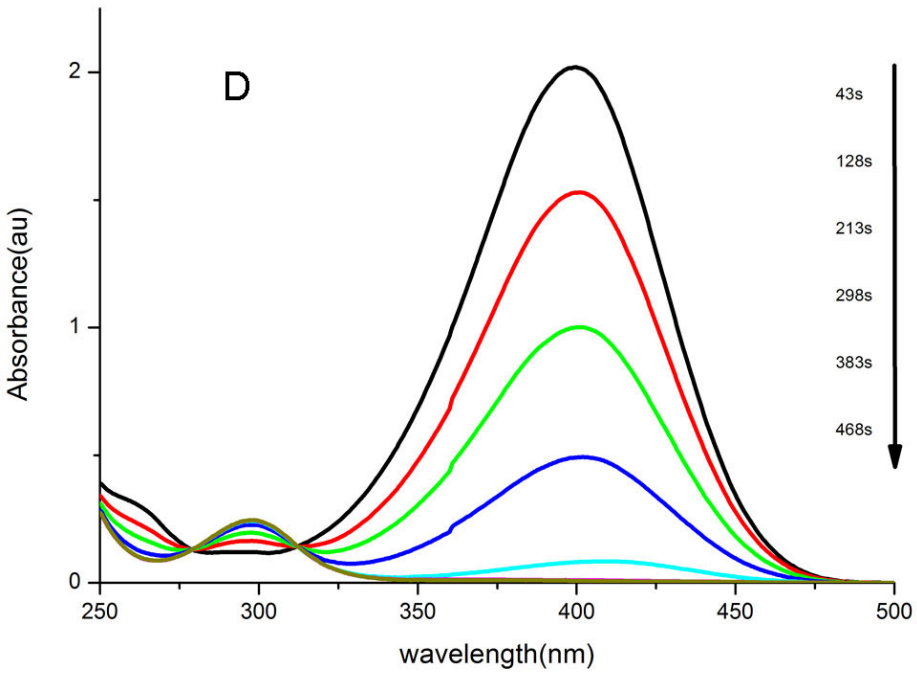

D
Absorbance(au)
wavelength(nm)
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213s
298s
383s
468s

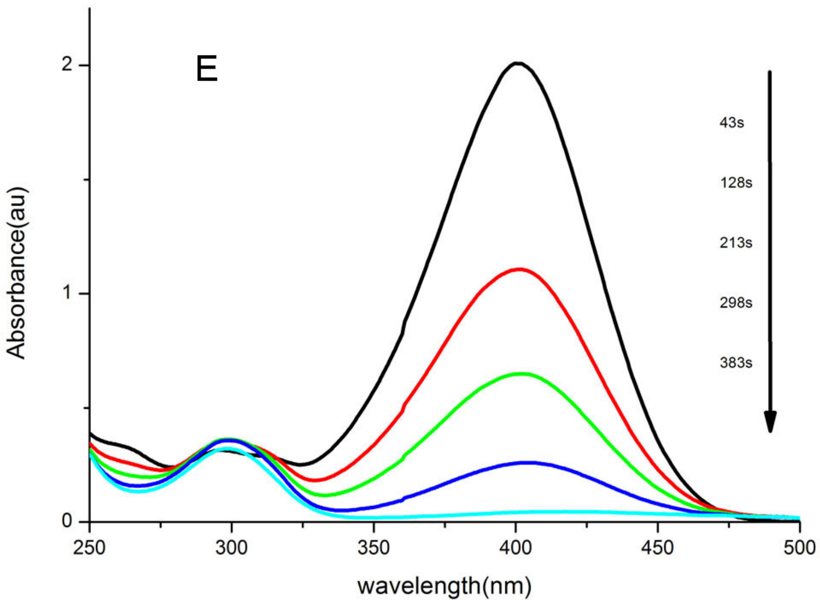

Fig. S11 The successive decrease of the UV-Vis spectrum of the reduction of p-nitrophenol by using (A) Au@SiO_2@Ag nanorods; (B) tip coated Au@SiO_2@AgPt nanorod/nanodots superstructure; (C) tip/edge coated Au@SiO_2@AgPt nanorod/nanodots superstructure; (D) core-satellite Au@SiO_2@AgPt nanorod/nanodots with low Pt density superstructure; (E) core-satellite Au@SiO_2@AgPt nanorod/nanodots with high Pt density superstructure

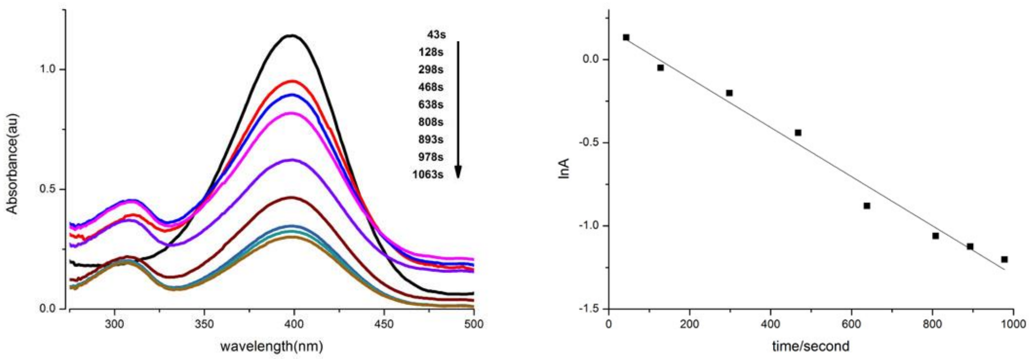

Fig. S12 The successive decrease of the UV-vis spectrum of the reduction of p-nitrophenol by Pt nanodots (left); Plots of lnA versus time for the reduction of para-nitrophenol catalysis by Pt nanodots.

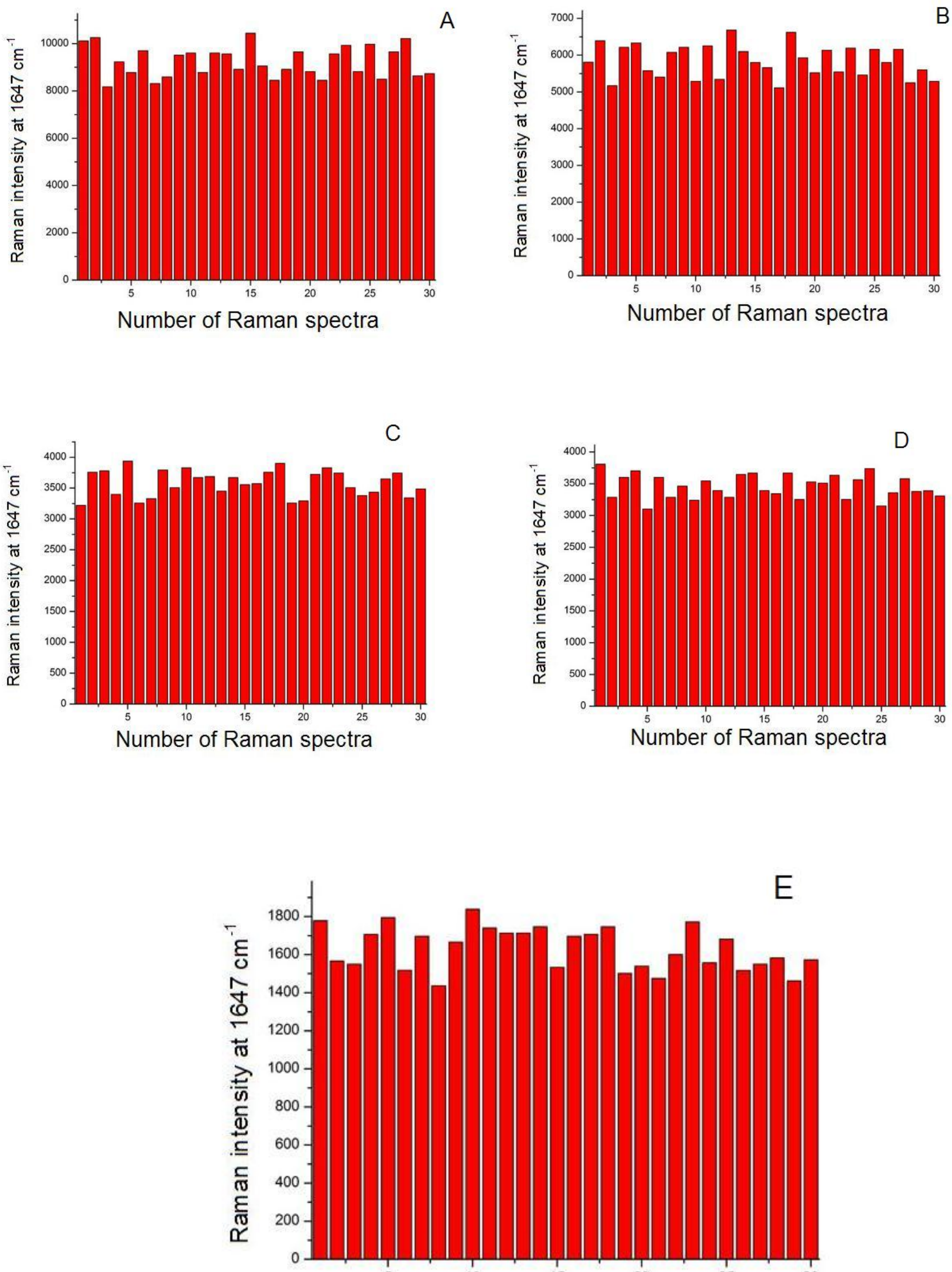

Fig. S13 The intensity of the main Raman vibrational of R6G with concentration 10^{-7} M in 30 points SERS spectra collected on the (A) Au@SiO_2@Ag core-shell nanorods, (B) tip coated Au@SiO_2@AgPt nanorod/nanodots superstructure; (C) tip/edge coated Au@SiO_2@AgPt nanorod/nanodots superstructure; (D) core-satellite Au@SiO_2@AgPt nanorod/nanodots with low Pt density superstructure; (E) core-satellite Au@SiO_2@AgPt nanorod/nanodots with high Pt density superstructure