

Supporting information

The fluorescence quenching and the aggregation induced emission behaviours of the silver nanoclusters labelled on poly (acrylic acid-co-maleic acid)

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P(AA-co-MA) in acetate buffer

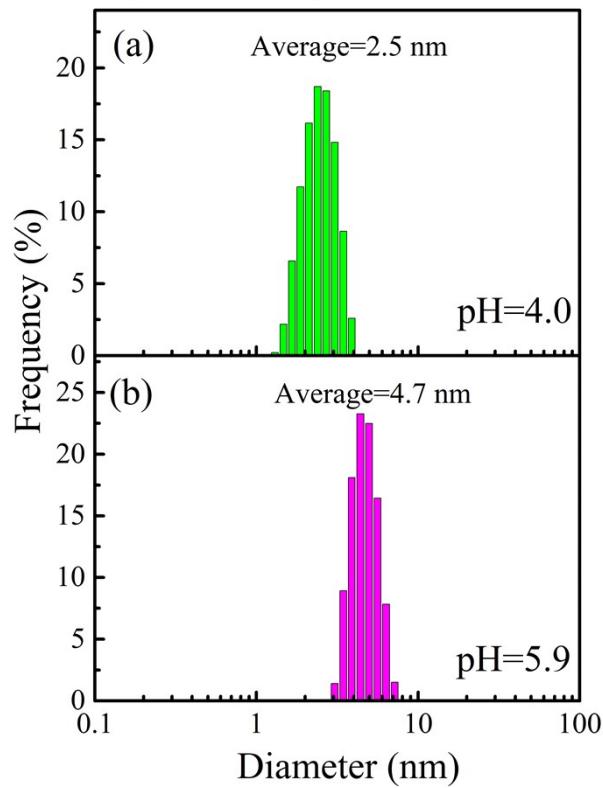


Figure S₁: The dynamic light scattering measurements of the P(AA-co-MA) in different pH

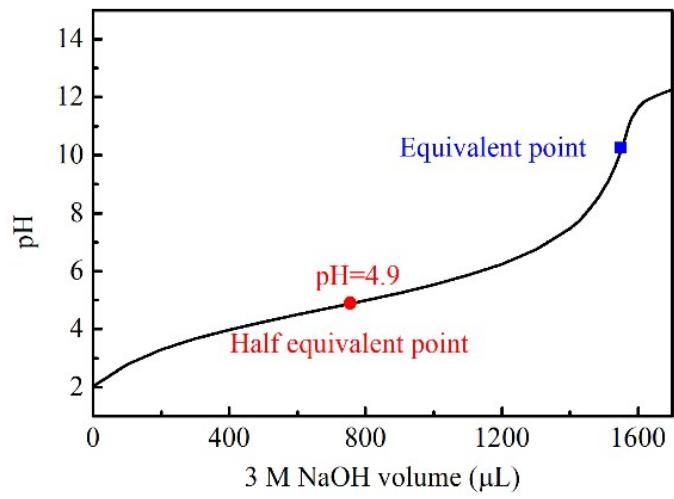


Figure S₂: The titration curve of the P(AA-co-MA) solution.

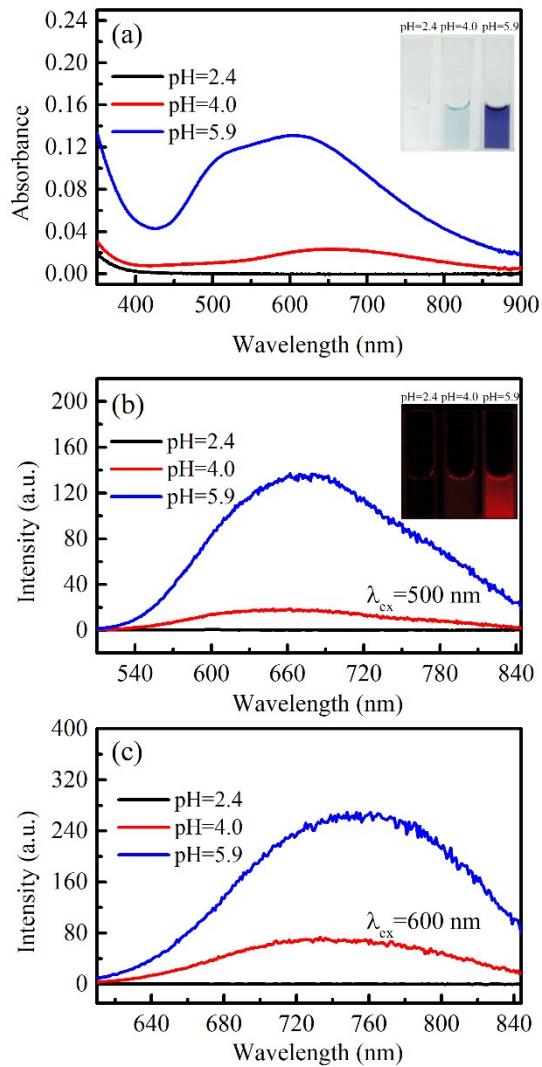


Figure S₃: The steady state absorption and emission spectra of the P(AA-co-MA) AgNCs prepared in pH=2.4, 4.0 and 5.9 acetate buffer solutions. The $[COO^-]/[Ag^+]=10$, exposure time=10 hours, temperature=30°C.

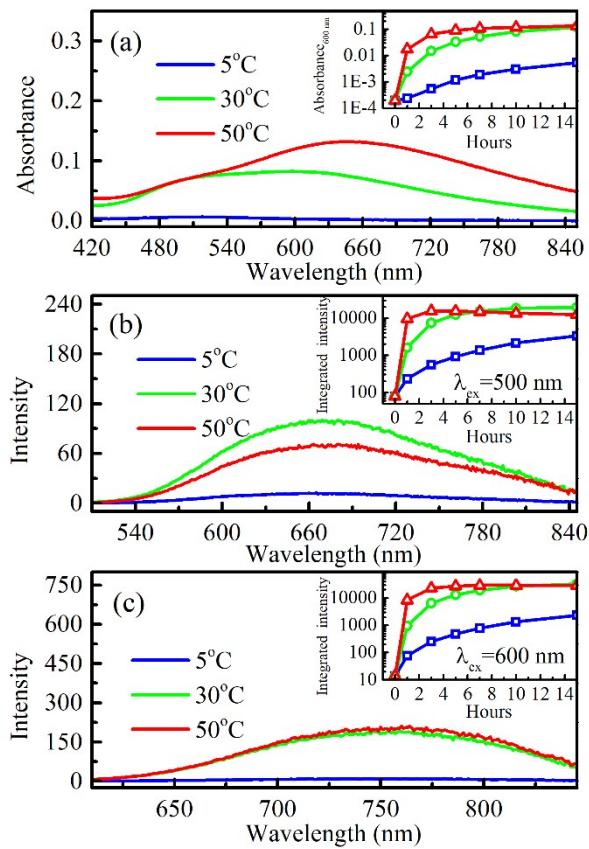


Figure S4: The absorption and emission spectra of the P(AA-co-MA) AgNCs measured at different temperatures. The reaction time was fixed at 10 hours. The inset indicates the time-dependent (a) absorption and (b: $\lambda_{ex}=500$ nm; c: $\lambda_{ex}=600$ nm) emission changes at different temperature. The $[COO^-]/[Ag^+]=10$ and the pH of the solution is 5.9.

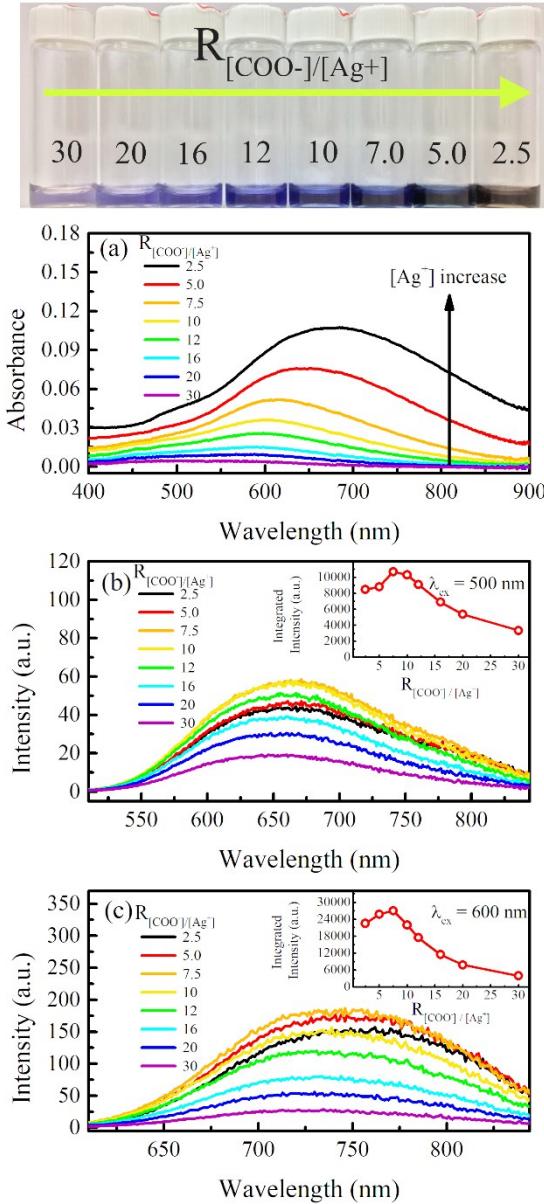


Figure S₅: The absorption and the emission spectra of the P(AA-co-MA) AgNCs prepared at different $[\text{COO}^-]/[\text{Ag}^+]$ ratios. The upper panel shows the color of the P(AA-co-MA) AgNCs prepared at different $[\text{COO}^-]/[\text{Ag}^+]$ ratios.

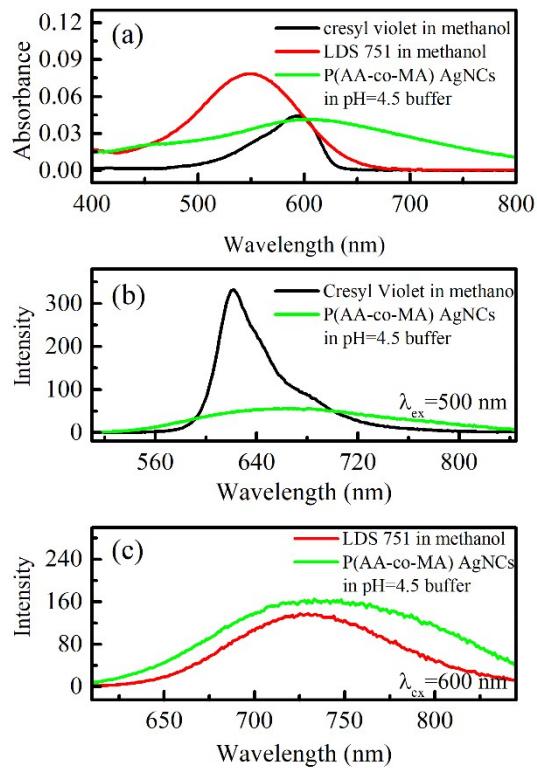


Figure S6: The (a) absorption and the emission spectra of the P(AA-co-MA) AgNCs excited at (b) 500 nm and (c) 600 nm. The Cresyl Violet ($\lambda_{ex}=500\text{ nm}$, quantum yield=0.54) and the LDS 751 ($\lambda_{ex}=600\text{ nm}$, quantum yield=0.014) in methanol solution were served as the fluorescence standards for the quantum yield measurement.

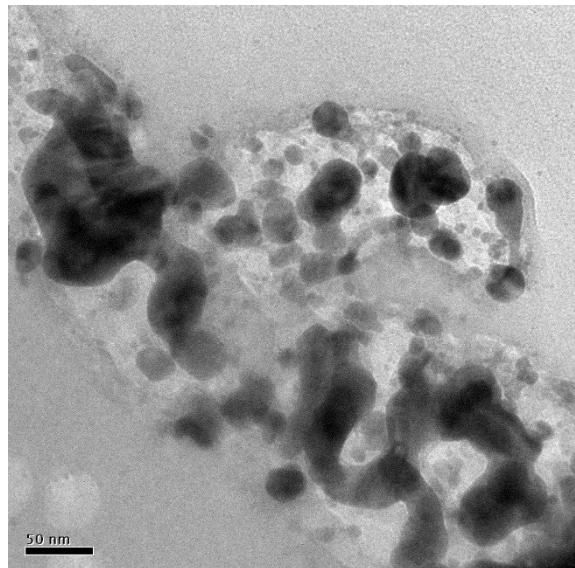


Figure S₇: The TEM image of the P(AA-co-MA) AgNCs in pH=3.6 acetate buffer solution.

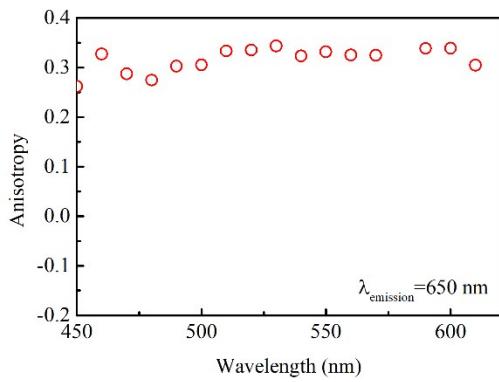


Figure S₈: The steady state fluorescence anisotropy ($r(\lambda)$) of the excitation spectra. The $r(\lambda) = \frac{I_{VV}(\lambda) - I_{VH}(\lambda) \cdot G(\lambda)}{I_{VV}(\lambda) + 2 \cdot I_{VH}(\lambda) \cdot G(\lambda)}$, in which the $G(\lambda) = \frac{I_{HV}(\lambda)}{I_{HH}(\lambda)}$. The two subscripts indicate the polarization the polarization of the excitation and the emission light is vertical (V) or horizontal(H) respect to the optical table.

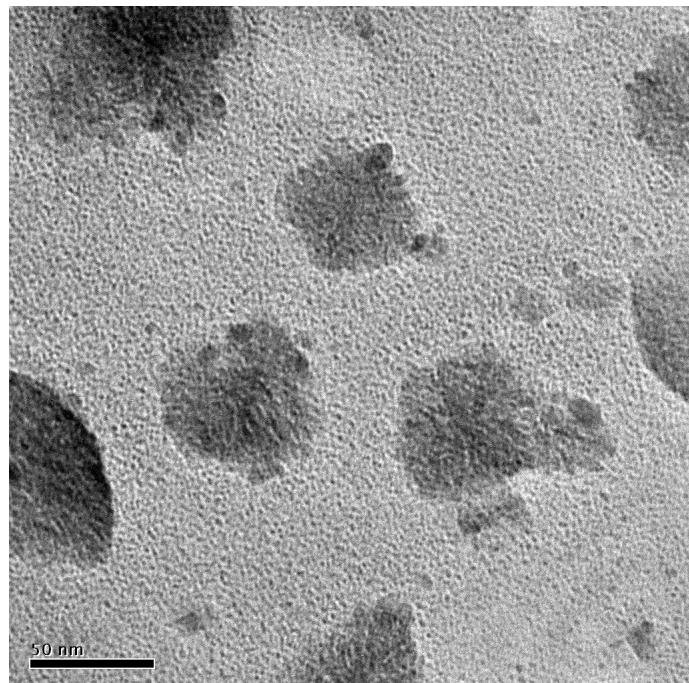


Figure S₉: The TEM image of the P(AA-co-MA) AgNCs+0.033 mM GSH.

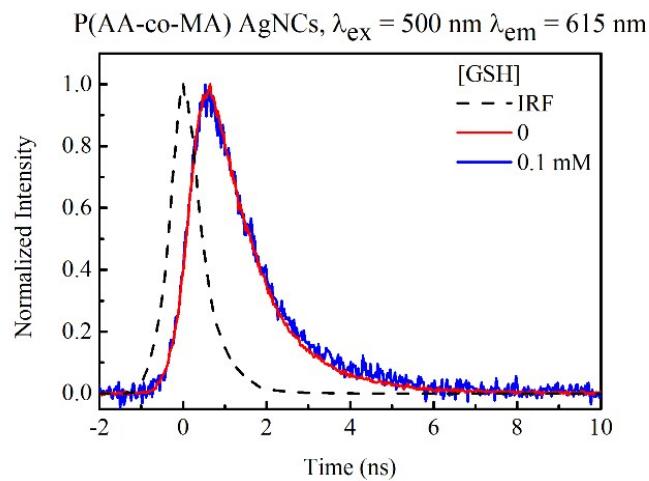


Figure S₁₀: The fluorescence decay dynamics of the P(AA-co-MA) AgNCs in absence and in the presence of 0.1 mM GSH.

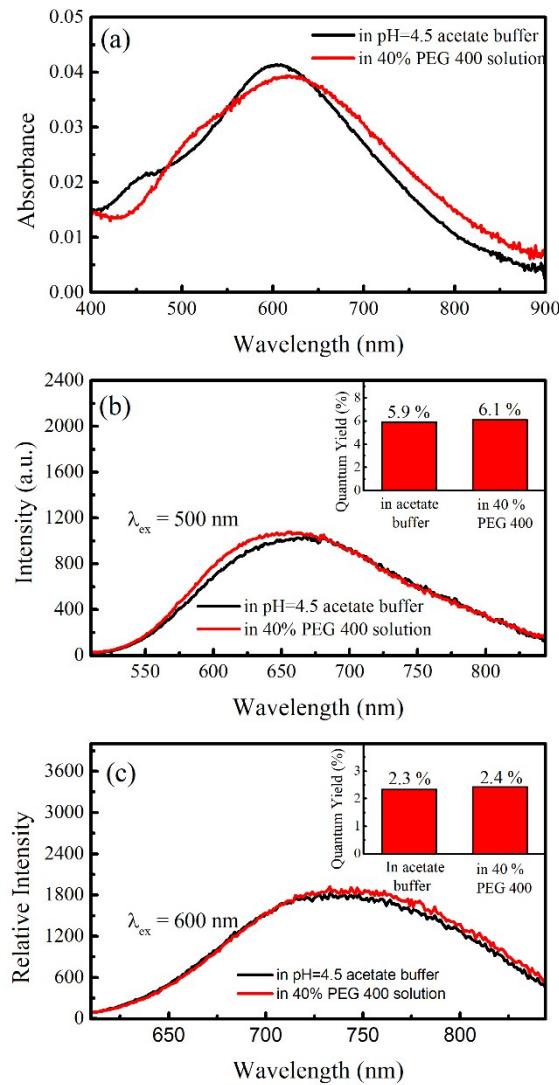


Figure S₁₁: The (a) absorption and the emission spectra (b: $\lambda_{\text{ex}}=500 \text{ nm}$; c: $\lambda_{\text{ex}}=500 \text{ nm}$)of the P(AA-co-MA) AgNCs in pH=4.5 solution and 40% PEG 400 solution.

Table S₁: The multi-exponential fitting parameters of the P(AA-co-MA) AgNCs excited at 500 nm. The $\langle\tau\rangle$ indicates the intensity averaged lifetime.

$\lambda_{\text{emission}}$ (nm)	A ₁	τ_1 (ns)	A ₂	τ_2 (ns)	$\langle\tau\rangle$ (ns)
550	0.81	0.4	0.19	1.3	0.79
580	0.75	0.4	0.25	1.3	0.87
615	0.65	0.4	0.35	1.3	0.97
650	0.57	0.4	0.43	1.3	1.04
680	0.50	0.4	0.50	1.3	1.09
700	0.45	0.4	0.55	1.3	1.12

Table S₂: The multi-exponential fitting parameters of the P(AA-co-MA) AgNCs excited at 635 nm. The $\langle\tau\rangle$ indicates the intensity averaged lifetime.

$\lambda_{\text{emission}}$ (nm)	A ₁	τ_1 (ns)	A ₂	τ_2 (ns)	A ₃	τ_3 (ns)	$\langle\tau\rangle$ (ns)
700	0.46	0.14	0.36	0.69	0.18	1.67	1.11
740	0.42	0.14	0.40	0.69	0.18	1.67	1.10
760	0.41	0.14	0.42	0.69	0.17	1.67	1.08
780	0.39	0.14	0.45	0.69	0.17	1.67	1.07
800	0.38	0.14	0.47	0.69	0.16	1.67	1.05