

SUPPORTING INFORMATION

Fluorescence Quenching of Tyrosine-Ag Nanoclusters by Metal Ions: Analytical and Physicochemical Assessment

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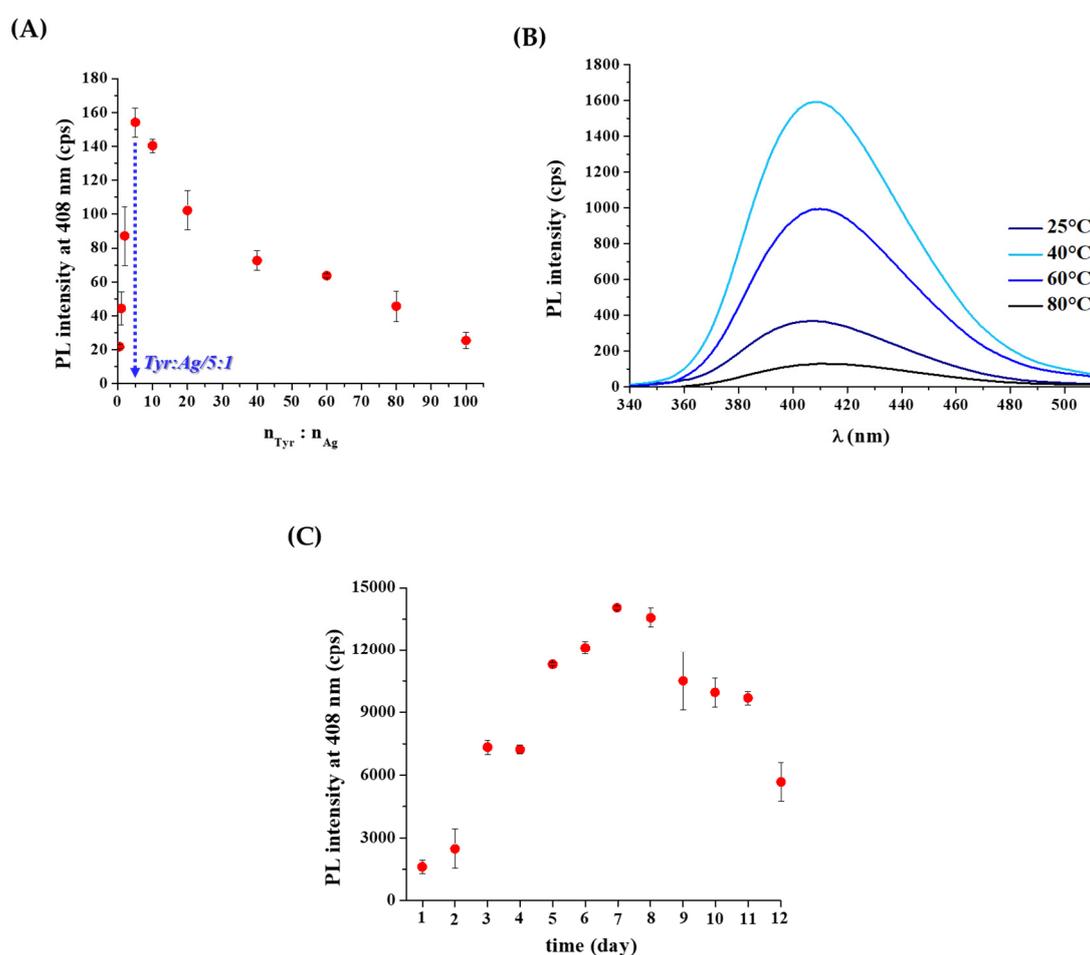


Figure S1. (A) The emission intensity at 408 nm depending on the applied molar ratios of Tyr:Ag⁺ system after 24 h ($\lambda_{\text{ex}} = 314$ nm; $c_{\text{Ag}} = 0.1$ mM; $T_{\text{reaction}} = 80$ °C; pH = 12). (B) The emission spectra of the samples depending on the applied reaction temperature after 24 h (Tyr:Ag⁺/5:1; $\lambda_{\text{ex}} = 314$ nm; $c_{\text{Ag}} = 0.2$ mM; pH = 11.5). (C) The emission intensity values at 408 nm depending on the reaction time (Tyr:Ag⁺/5:1; $\lambda_{\text{ex}} = 314$ nm; $c_{\text{Ag}} = 0.2$ mM; pH = 11.5; $T = 40$ °C).

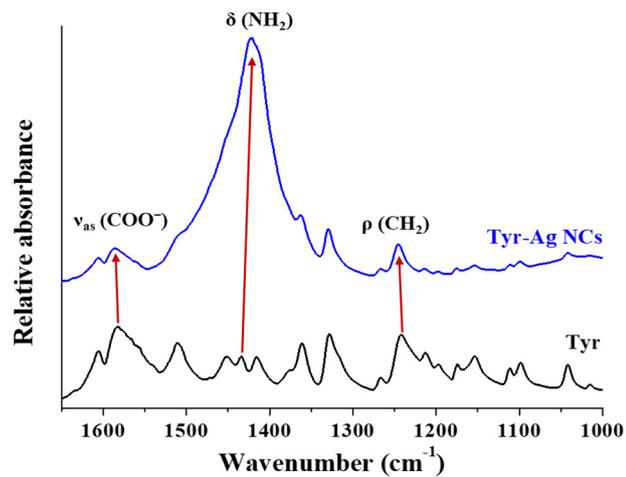


Figure S2. The IR spectra of the pure amino acid (black line) and the prepared Tyr-AgNCs (blue line).

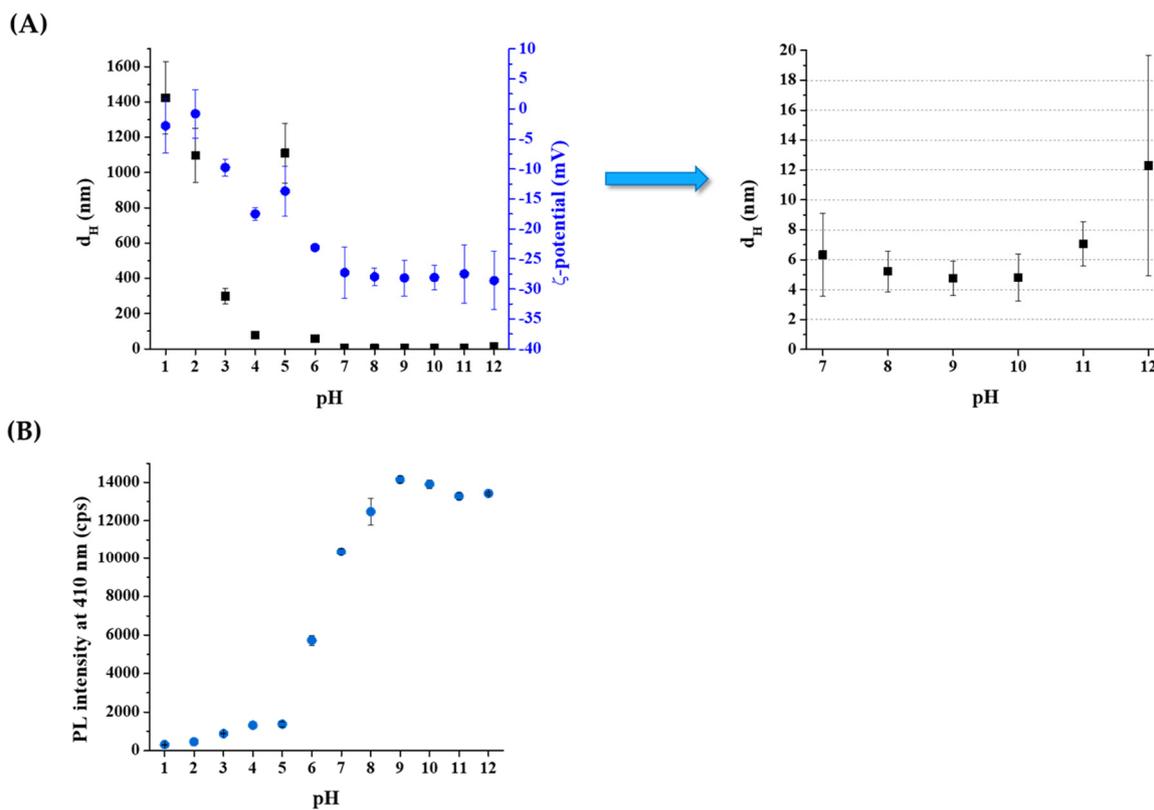


Figure S3. (A) The measured hydrodynamic diameters (d_H) and the ζ -potentials of the Tyr-AgNCs depending on the pH with the set of the diameters between pH = 7–12 ($I = 0.05$ M by NaCl). (B) The emission intensity of the Tyr-AgNCs depending on the pH of the purified NCs dispersion ($\lambda_{\text{ex}} = 320$ nm; $\lambda_{\text{em}} = 410$ nm; $T = 25$ °C; $I = 0.05$ M by NaCl).

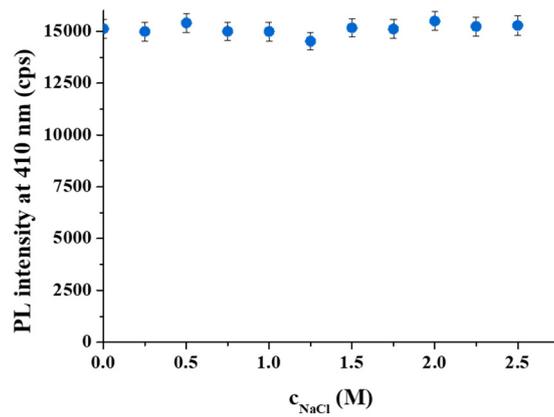


Figure S4. The detected emission intensity of the Tyr-AgNCs at different concentration of NaCl ($\lambda_{\text{ex}} = 320 \text{ nm}$; $\lambda_{\text{em}} = 410 \text{ nm}$; $T = 25 \text{ }^\circ\text{C}$; $\text{pH} = 11$).

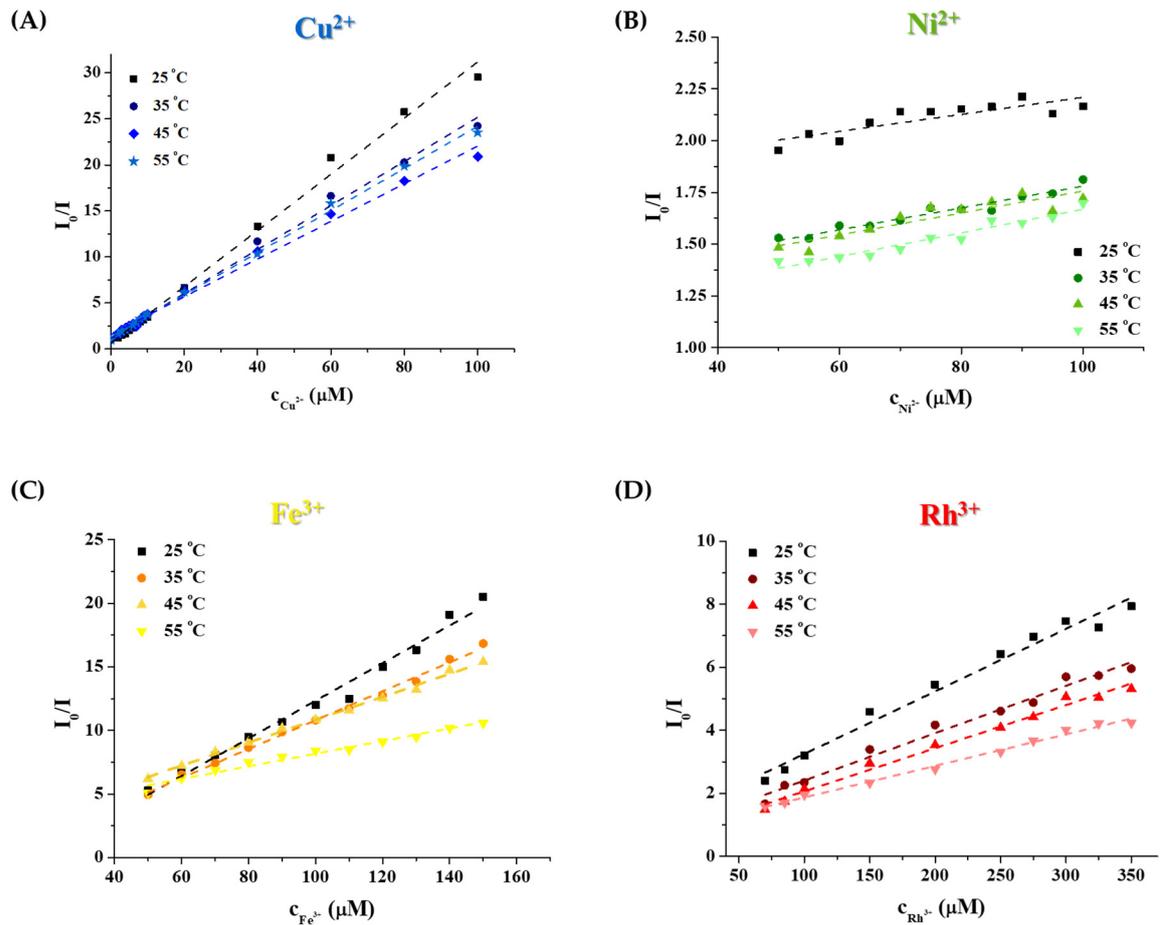


Figure S5. The Stern-Volmer fitting of the quenching process in the case of (A) Cu^{2+} , (B) Ni^{2+} , (C) Fe^{3+} , and (D) Rh^{3+} ion at different temperatures.

Table S1. The determined lifetimes (τ) before and after addition of Cu^{2+} , Ni^{2+} , Fe^{3+} , and Rh^{3+} ions ($T = 25\text{ }^\circ\text{C}$; $c_{\text{NaCl}} = 1\text{ M}$; $\text{pH} = 9.0$; $\lambda_{\text{ex}} = 295\text{ nm}$; $\lambda_{\text{em}} = 410\text{ nm}$, $c_{\text{Ag}} = 187.5\text{ }\mu\text{M}$).

	Tyr-AgNCs without metal ion	Cu^{2+} 60 μM	Ni^{2+} 60 μM	Fe^{3+} 60 μM	Rh^{3+} 100 μM
τ_1 (ns)	3.80 ± 0.03	3.76 ± 0.07	3.40 ± 0.07	3.37 ± 0.05	3.30 ± 0.07
τ_2 (ns)	5.88 ± 0.03	6.16 ± 0.03	5.65 ± 0.02	6.50 ± 0.02	5.79 ± 0.02
χ^2	1.09	1.14	1.06	1.26	1.14

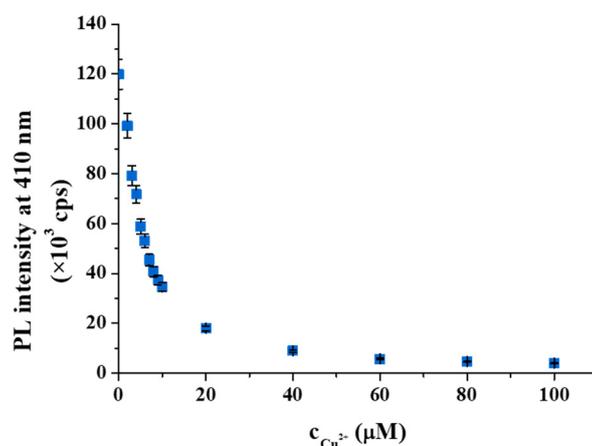


Figure S6. Representative quenching curves for the (A) Tyr-AgNCs – Cu^{2+} systems ($T = 25\text{ }^\circ\text{C}$; $c_{\text{NaCl}} = 1\text{ M}$; $\text{pH} = 9.0$; $\lambda_{\text{ex}} = 295\text{ nm}$; $\lambda_{\text{em}} = 410\text{ nm}$, $c_{\text{Ag}} = 18.75\text{ }\mu\text{M}$).

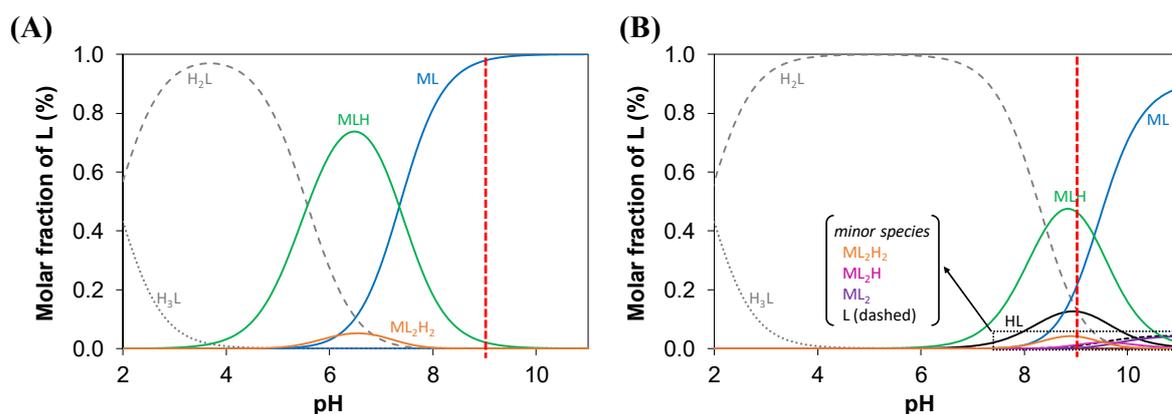


Figure S7. Concentration distribution curves of the (A) Cu^{2+} :Tyr (1:0.38) and (B) Ni^{2+} :Tyr (1:0.38) systems, calculated on the basis of stability constants reported by L.D. Petit et al. Ref. [55]. L denotes the completely deprotonated Tyr, charges of the species are omitted for simplicity. ($c_{\text{metal ion}} = 50\text{ }\mu\text{M}$; $c_{\text{Tyr}} = 18.75\text{ }\mu\text{M}$; $I = 0.1\text{ M}$ (KNO_3); $T = 25\text{ }^\circ\text{C}$)

Note: concentration of the Tyr corresponds to that of the NCs applied in the quenching experiments.