Supplementary Materials: Ammonium-Induced Synthesis of Highly Fluorescent Hydroxyapatite Nanoparticles with Excellent Aqueous Colloidal Stability for Secure Information Storage

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Table S1. Elemental analysis of samples prepared with varied R_{AMP} values for 4-h hydrothermal time.

R_{AMP} (%)	Weight (mg)	N (%)	C (%)	H (%)
0	4.668	0.00	6.85	0.7255
5	4.9615	0.00	5.75	0.666
50	4.8695	0.02	5.51	0.6305
100	5.0345	0.145	4.89	0.503

Table S2. Recently reported cases of self-motivated fluorescent hydroxyapatite.

Ref.	Source of Nitrogen	Temperature (°C)	Time/h	Excitation Wavelength /nm	Emission Wavelength /nm	Fluorescence Lifetime/ns	Quantum Yield/%
[48]	$NH_3{\cdot}H_2O/(NH4)_2HPO_4$	180	24	341	428	7.2	/
[49]	$NH_4H_2PO_4$	180	24	344	427	9.2	31
[27]	$NH_3{\cdot}H_2O/(NH4)_2HPO_4$	180	24	345	432	11.6	22
[28]	$NH_3{\cdot}H_2O/(NH4)_2HPO_4$	180	24	351	432	/	/
[29]	$NH_3{\cdot}H_2O$ $/(NH4)_2HPO_4$	190	24	340	427	/	/
[50]	$NH_3{\cdot}H_2O/(NH4)_2HPO_4$	190	24	341	428	/	/
[51]	$NH_3{\cdot}H_2O/(NH4)_2HPO_4$	190	24	341	427	/	/
[52]	$NH_3{\cdot}H_2O/(NH4)_2HPO_4$	180	24	337	441	/	/
[30]	Ammonium citrate	190	24	336	432	4.36	40.16
This study	$(NH_4)_3PO_4$	180	4	340	440	7.9	73.8

Table S3. Recently reported cases of citrate-derived fluorescent carbon nanodots.

Ref	Reaction Materials	Temperature °C	Time/h	Excitation Wavelength/nm	Emission Wavelength/nm	Fluorescence Lifetime/ns	Quantum Yield/%
[53]	Citric acid, urea	160	8	360	435	7.6	71
[54]	Ammonium citrate	160	6	365	437	10.6	13.5
[55]	Citric acid, dicyandiamide	180	3	370	452	4.78	36.5
[56]	Citric acid, dicyandiamide	180	12	350	440	/	32.4
[57]	Citric acid, EDA, PEG-2000	160	8	350	450	/	75.8
[58]	Sodium citrate, NH_4HCO_3	200	3	340	440	6.52	31
[59]	Trisodium citrate, L-cysteine	200	2	400	505	15.8	/
[60]	Sodium citrate, urea	160	6	370	446	7.60	67
[61]	Sodium citrate, polyacrylamide	200	3	343	434	/	18
[62]	Sodium citrate, diammonium phosphate	170	6	340	440	5.82	53.8
[63]	Sodium citrate, histidine	200	6	350	440	/	29.7

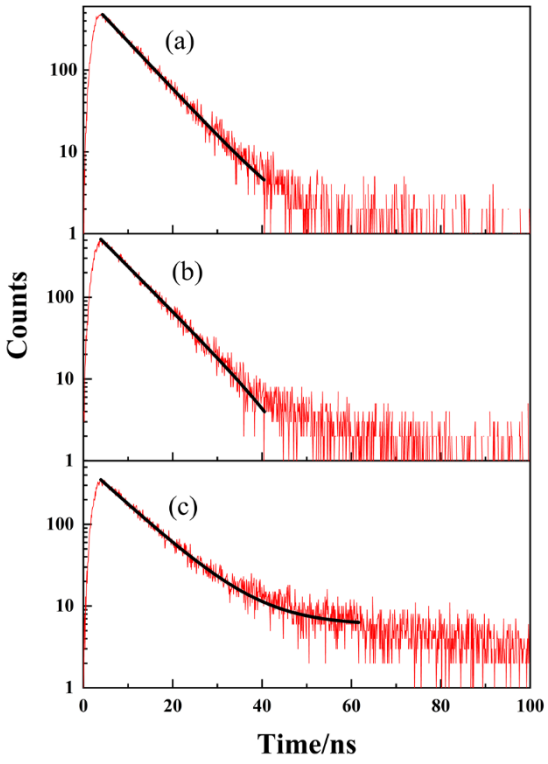

Figure S1. Lifetime (τ) of fluorescent hydroxyapatite synthesized at R_{AMP} values of (**a**) 5%; (**b**) 50%; and (**c**) 100%. The hydrothermal time was 4 h.

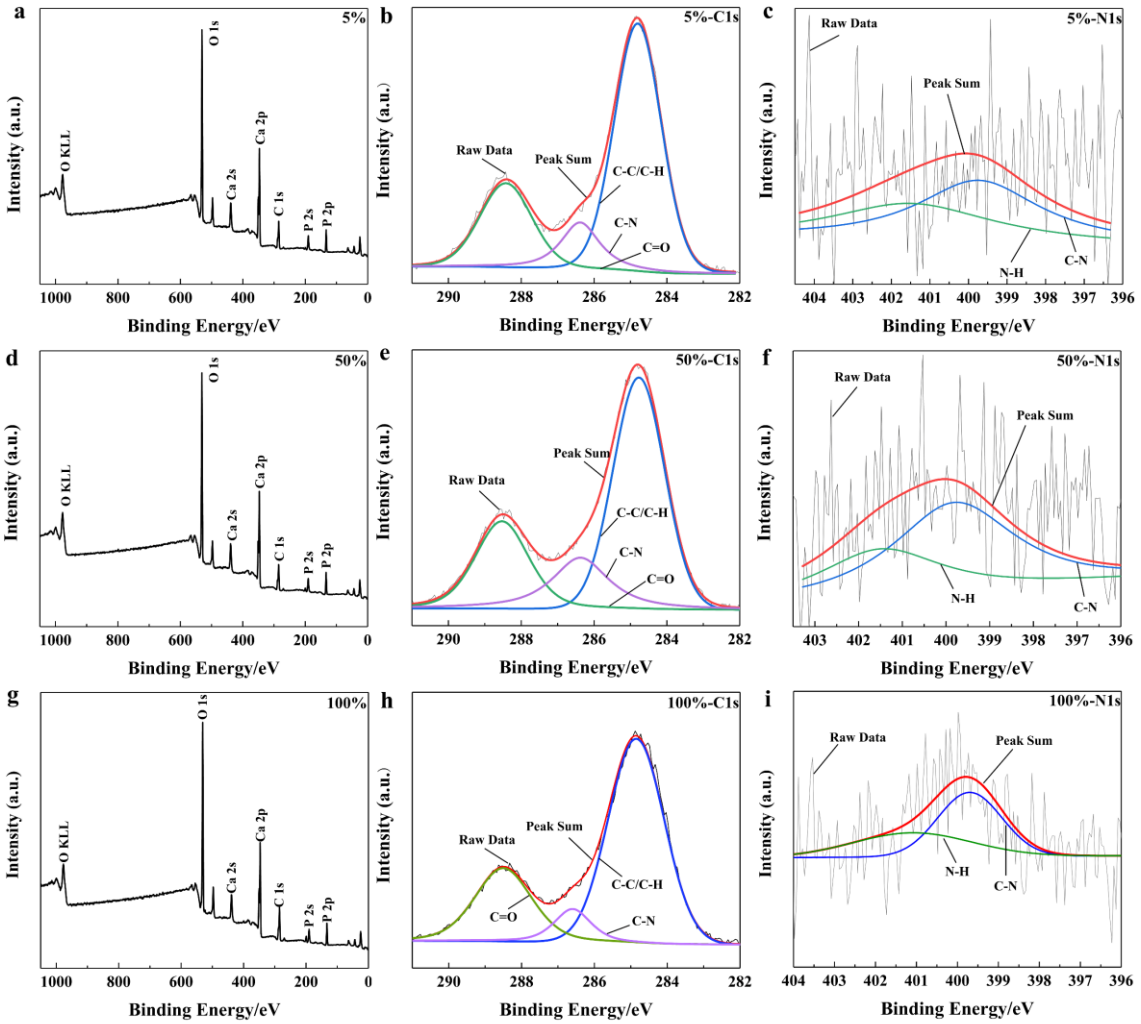

Figure S2. XPS survey spectrum, and C 1*s* and N 1*s* high-resolution XPS spectra, of samples with R_{AMP} values of 5% (**a**–**c**), 50% (**d**–**f**), and 100% (**g**–**i**). The hydrothermal time was 4 h.

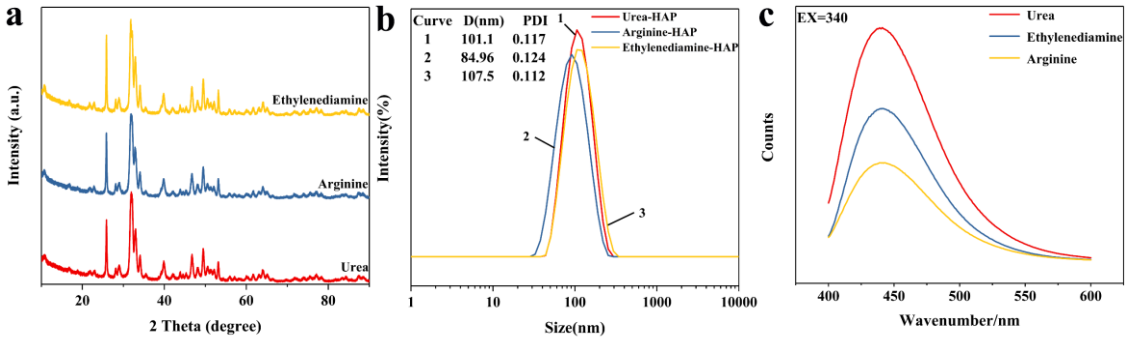

Figure S3. Synthesizing fluorescent hydroxyapatite using other compounds containing an NH_2 group.