Anion-triggered melamine based self-assembly and hydrogel

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Supporting Information

Chemicals and characterizations

All chemicals commercially available at AR grade were used as received.

Infrared (IR) spectra were conducted on Nicolet AVATAR FT-IR360 spectrophotometer. X-Ray powder diffractions (XRD) were performed on Panalytical X'pert PRO diffractometer equipped with Cu Kα radiation (λ = 1.5418 Å) at room temperature. Field emission scanning electron microscopy (FESEM) experiments were carried out on HITACHI S-4800 working at an accelerating voltage of 20 kV. Transmission electron microscopy (TEM) experiments were performed on HITACHI H-7650 system. Elemental analysis data were obtained on Vario EL III analyzer. For XRD, IR, and elemental analysis characterization, samples were prepared by freeze-drying the original hydrogels under vacuum at -80 ^{o}C, the corresponding xerogels were then washed several times by water to remove free ions and melamine and then dried in vacuum at room temperature.

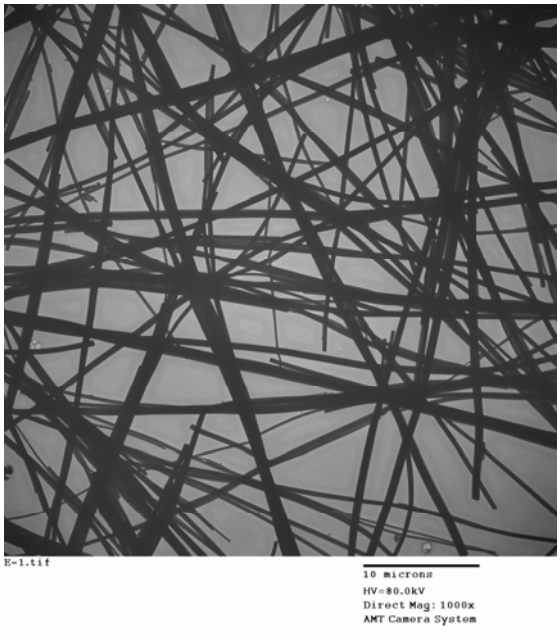

Fig. S1 TEM image of melamine (M) xerogel from the corresponding original hydrogel of protonated M triggered by PO_4^{3-}. The scale bar is 10 μm.

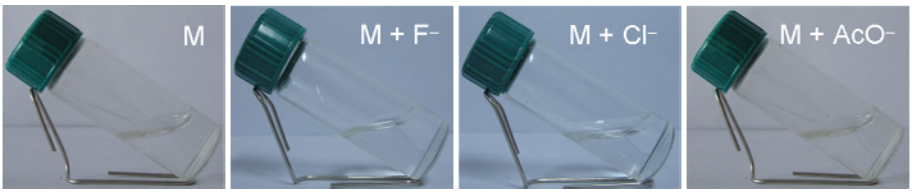

Fig. S2 No gelation of protonated melamine (M) could be observed in the presence of F^-, Cl^-, and AcO^-, respectively. The molar ratio of anion to M was 6:1 and the total concentration was 700 mM, and pH was 2-5.

Table S1. Experimental conditions and observations of melamine (M)-anion systems

Anions	[anion] / mM	[M] / mM	[anion] / [M]	pH	observation
F^-	600	100	6 : 1	*ca*.2-5	Sol
Cl^-	600	100	6 : 1	*ca*.2-5	Sol
NO_3^-	300	50	6 : 1	*ca*.2-5	Gel
PO_4^{3-}	600	100	6 : 1	*ca*.2-5	Gel
SO_4^{2-}	450	75	6 : 1	5	Gel
ATP	100	100	1 : 1	*ca*.2-5	Gel
AcO^-	600	100	6 : 1	*ca*.2-5	Sol

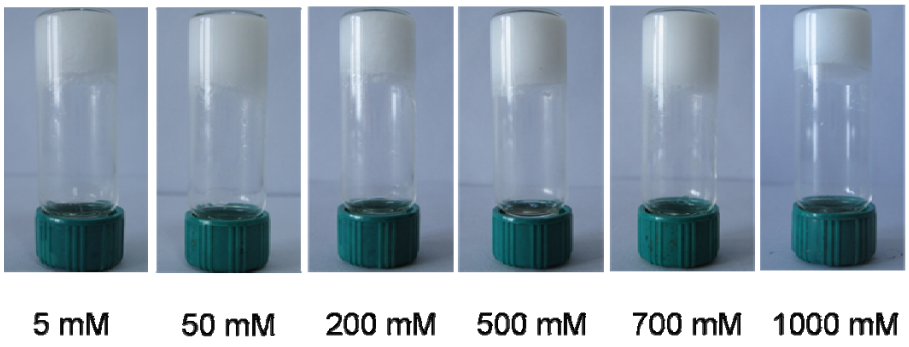

Fig. S3 Ionic strength effect on the hydrogelation of protonated melamine (M) triggered by NO_3^-. NaCl concentration varied from 5 to 1000 mM. The molar ratio of NO_3^- to M was 6:1 and the total concentration of M-NO_3^- was 700 mM. pH was 2-5.

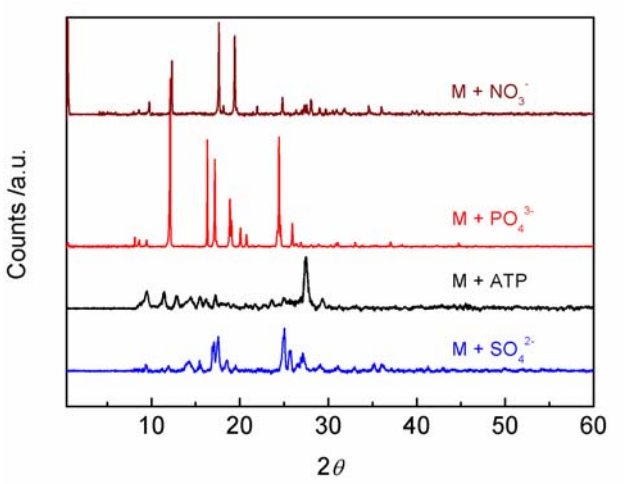

Fig. S4 X-ray diffraction patterns of the xerogels from the corresponding original hydrogels of protonated melamine (M) triggered by NO_3^-, PO_4^{3-}, SO_4^{2-}, and ATP, respectively.

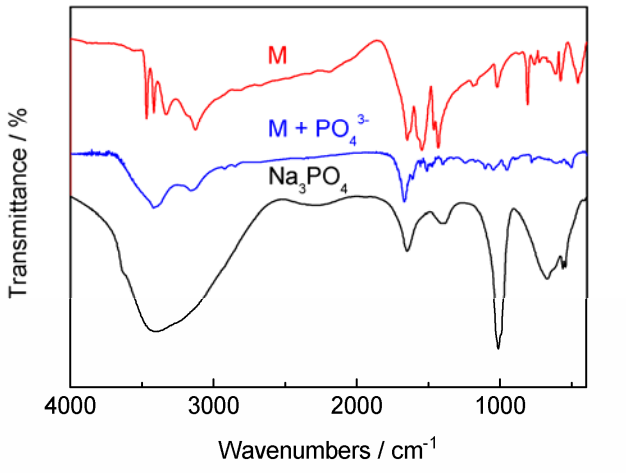

Fig. S5 IR spectra in KBr pellet of melamine (M), Na_3PO_4, and $M(H^+)_m$-PO_4^{3-} xerogel from the corresponding original hydrogel of protonated melamine triggered by PO_4^{3-}

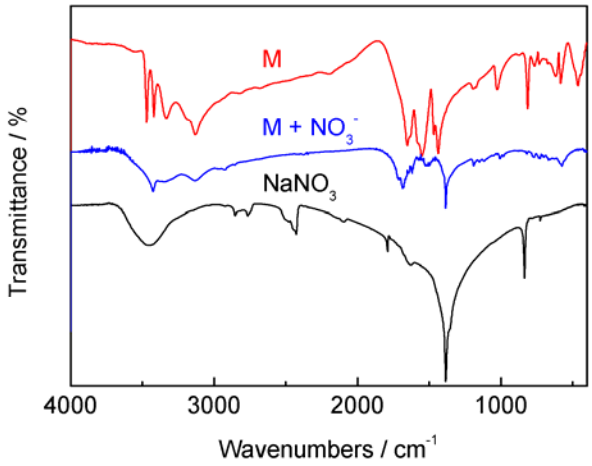

Fig. S6 IR spectra in KBr pellet of melamine (M), $NaNO_3$, and $M(H^+)_m$-NO_3^- xerogel from the corresponding original hydrogel of protonated melamine triggered by NO_3^-

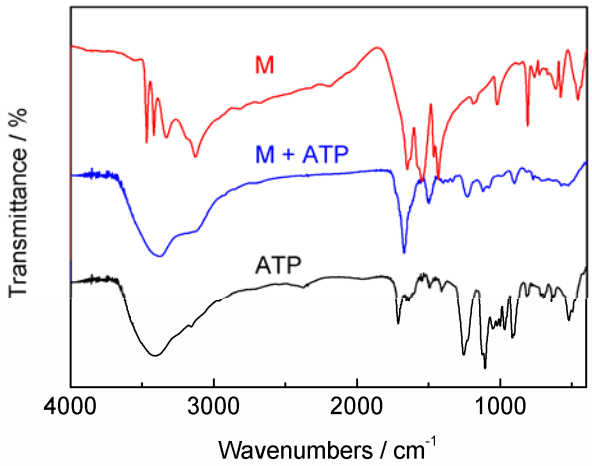

Fig. S7 IR spectra in KBr pellet of melamine (M), ATP, and $M(H^+)_m$-ATP xerogel from the corresponding original hydrogel of protonated melamine triggered by ATP

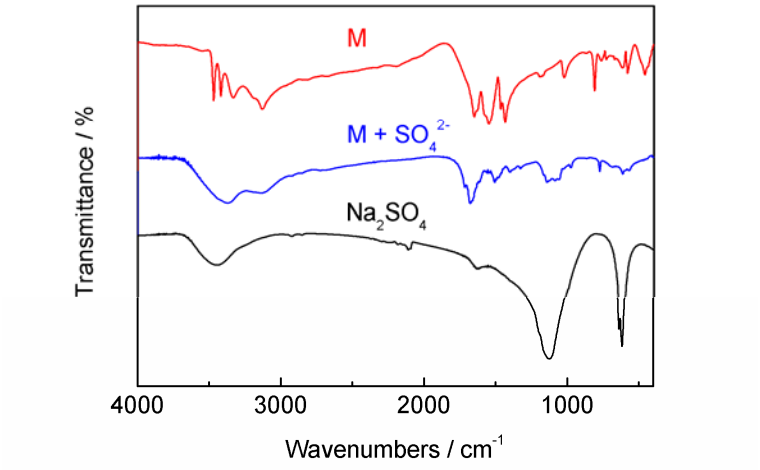

Fig. S8 IR spectra in KBr pellet of melamine (M), Na_2SO_4, and $M(H^+)_m$-SO_4^{2-} xerogel from the corresponding original hydrogel of protonated melamine triggered by SO_4^{2-}

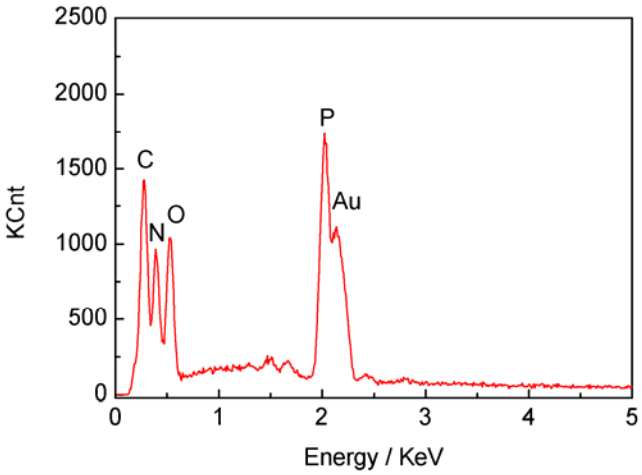

Fig. S9 EDX spectrum of $M(H^+)_m$-PO_4^{3-} xerogel from the corresponding original hydrogel of protonated melamine triggered by PO_4^{3-}

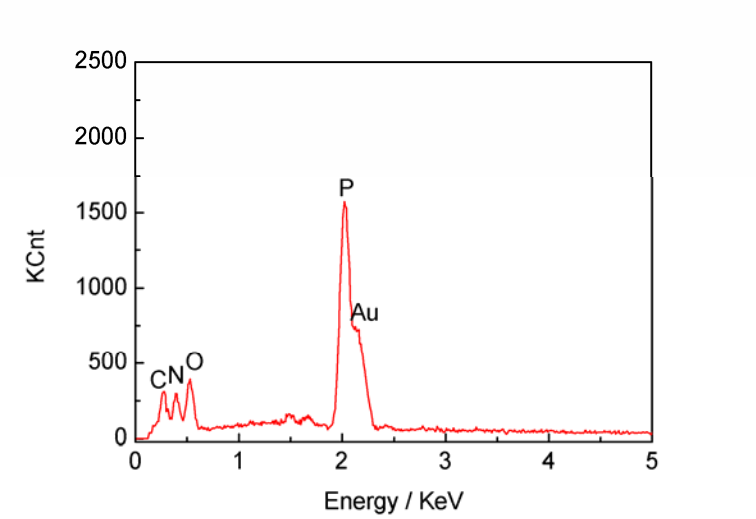

Fig. S10 EDX spectrum of $M(H^+)_m$-ATP xerogel from the corresponding original hydrogel of protonated melamine triggered by ATP

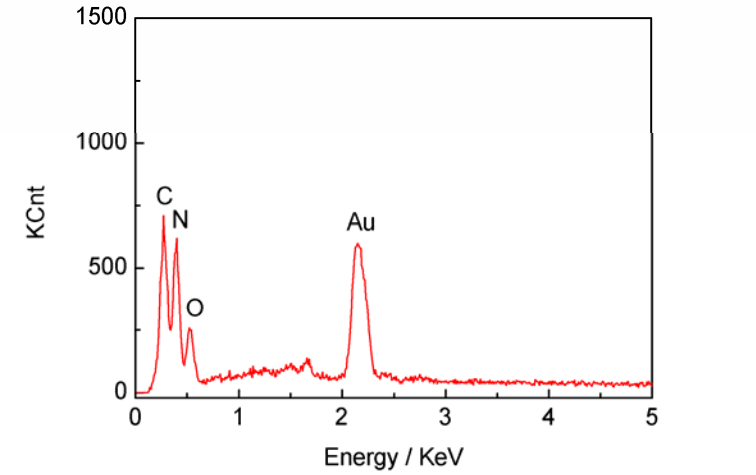

Fig. S11 EDX spectrum of $M(H^+)_m$-NO_3^- xerogel from the corresponding original hydrogel of protonated melamine triggered by NO_3^-

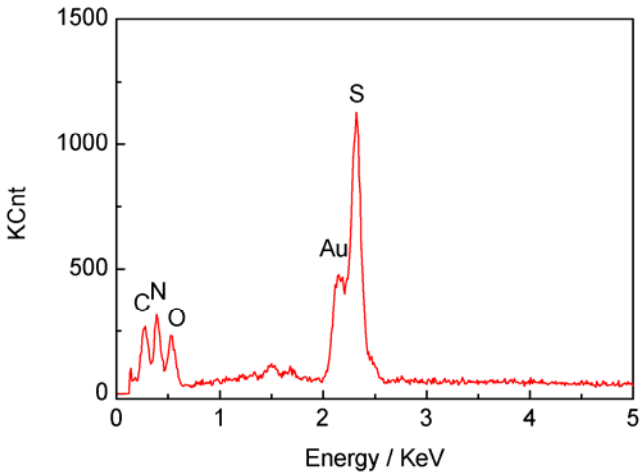

Fig. S12 EDX spectrum of $M(H^+)_m$-SO_4^{2-} xerogel from the corresponding original hydrogel of protonated melamine triggered by SO_4^{2-}

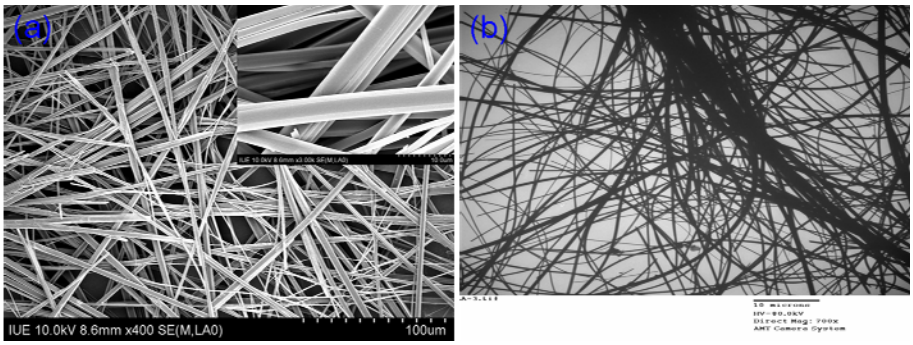

Fig. S13 FESEM (a) and TEM (b) images of melamine - NO_3^- sol system. Molar ratio of melamine to NO_3^- was 1:1 and total concentration was 50 mM. pH was 2-5. The scale bars for (a) and (b) are 100 μm and 10 μm, respectively. The scale bar for inset in (a) is 10 μm.

Table S2. Elemental analysis data of protonated $M(H^+)_m$-XO_y^{n-} xerogels

Sample name	Weight[a] / [mg]	Content / [%]	$n_M : n_{XOy}^{n-}$
M-NO_3^-	1.5680	N: 51.37; C: 18.74; H: 3.224	1:1
	2.6470	N: 51.22; C: 18.78; H: 3.462	1:1
M-PO_4^{3-}	2.2220	N: 37.95; C: 16.06; H: 4.404	1:1
	2.4280	N: 37.86; C: 16.02; H: 3.808	1:1
M-ATP	1.9630	N: 31.48; C: 22.60; H: 4.406	2:1
	1.9530	N: 31.21; C: 22.48; H: 4.479	2:1
M-SO_4^{2-}	3.6590	N: 44.18; C: 18.89; H: 4.411	3:2
	3.5480	N: 44.07; C: 18.87; H: 4.842	3:2

a. Every sample had two measurements.