Electronic Supplementary Material (ESI) for Soft Matter.

Supporting information

Eco-friendly floatable foam hydrogel for the adsorption of heavy metal ions and the generated waste for the catalytic reduction of organic dyes

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Table S1. Mathematical expressions of the kinetic models

Models	Mathematical expression	Parameters
Pseudo-first-order model	$\ln(q_e - q_t) = \ln q_e - k_1 t$	q_e was the equilibrium adsorption capacity (mg/g); q_t was the adsorption capacity at time t; k_1 (min^{-1}) was the pseudo-first order rate constants
Pseudo-second-model	$\frac{t}{q_t} = \frac{1}{k_2 q_e^2} + \frac{1}{q_e} t$	k_2 ($g \cdot mg^{-1} \cdot min^{-1}$) was pseudo-second order rate constants.
Intra-particle diffusion model	$q_t = K_{id} t^{0.5} + C_i$	K_{id} was the intra-particle diffusion rate constants

Table S2. Mathematical expressions of the adsorption isotherm models

Models	Expression	Parameters
Langmuir	$\frac{C_e}{q_e} = \frac{C_e}{q_m} + \frac{1}{K_L q_m}$	C_e was the equilibrium concentration of Cu^{2+} (mg/L); q_e was the equilibrium adsorption capacity of Cu^{2+} adsorbed onto the hydrogel (mg/g); q_m denoted maximum adsorption capacity; K_L was the Langmuir constant (L/mg)
Freundlich	$\ln q_e = \ln K_F + (1/n) \ln C_e$	K_F was the Freundlich constant

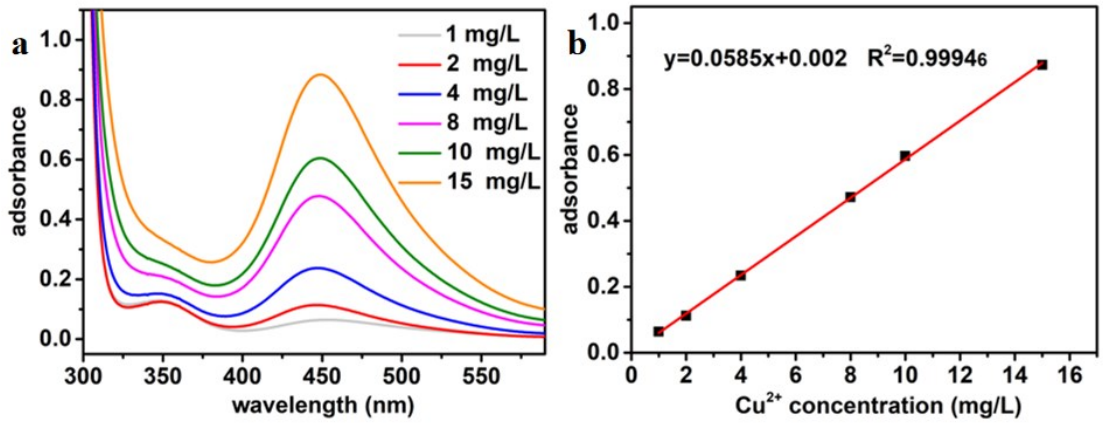

Figure S1 (a) UV spectrum of Cu^{2+}/SDDT (b) standard curve of Cu^{2+}/SDDT

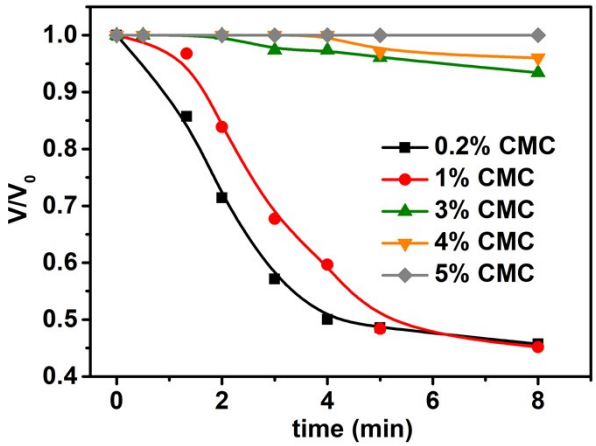

Figure S2. Effect of the CMC concentration on the foam stability, V and V_0 were the volume of the wet foam at time t and the initial volume of the wet foam, respectively

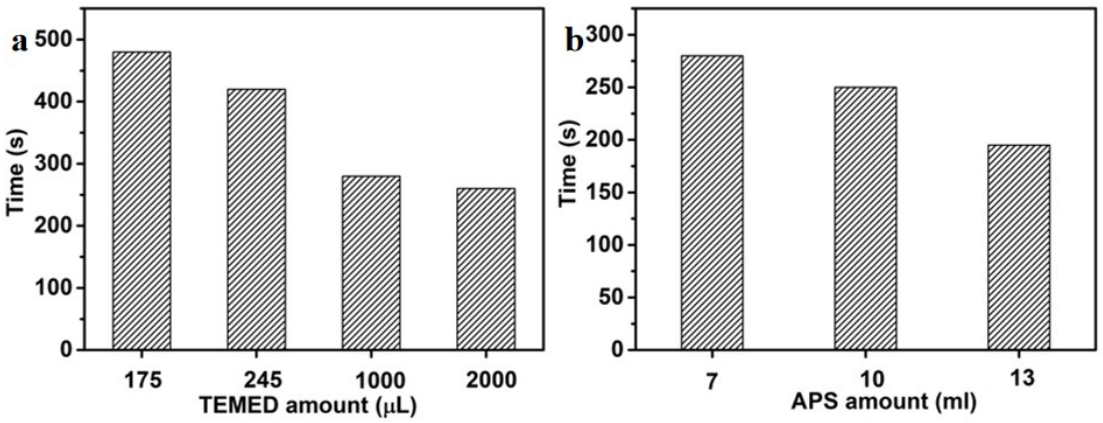

Figure S3. Effect of the amount of (a) TEMED and (b) APS on the crosslinking time

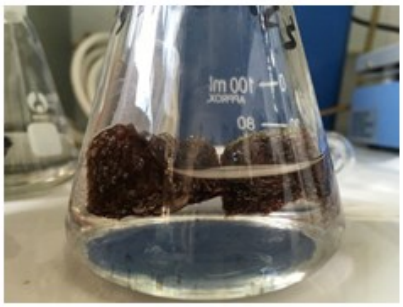

Figure S4. Pictures of PAM/CMC/DDM-Cu composite hydrogel

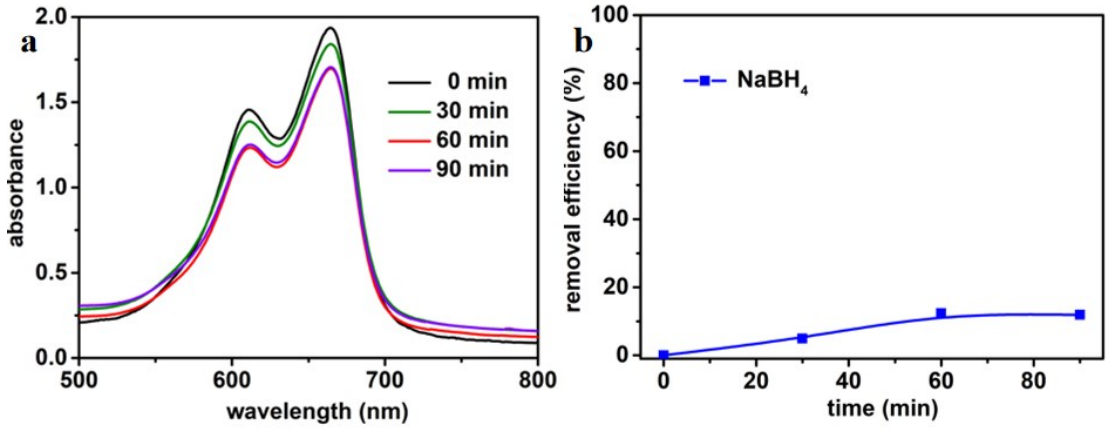

Figure S5. (a) UV-vis spectra of MB in the presence of $NaBH_4$ and (b) the corresponding catalytic reduction efficiency of MB

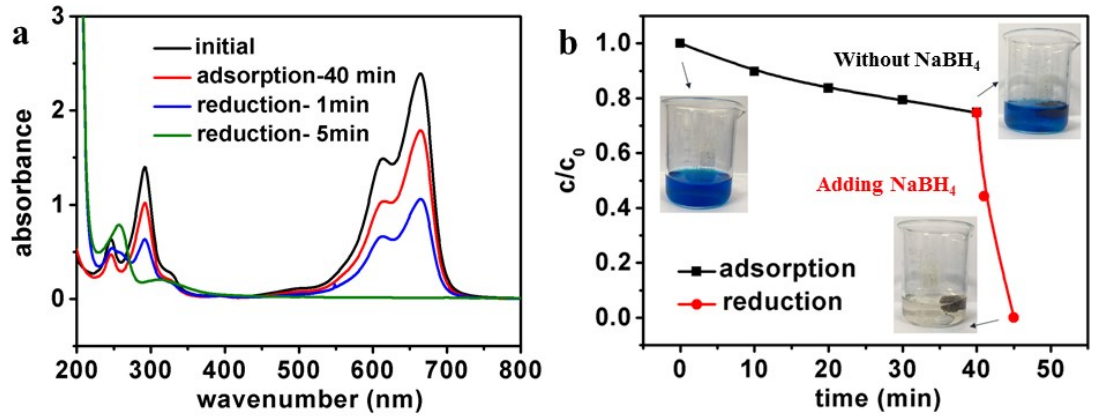

Figure S6. (a) UV-vis spectra of MB dye and (b) the temporal evolution in residual amount of MB dye when PAM/CMC3/DDM-Cu NPs composite hydrogel added into the system

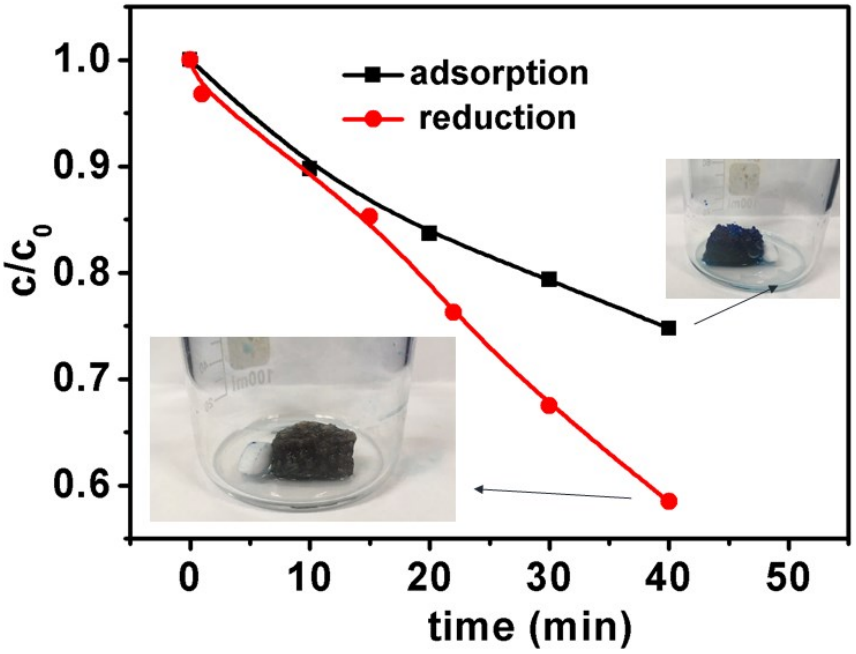

Figure S7. The temporal evolution in residual amount of MB dye when PAM/CMC3/DDM-Cu NPs composite hydrogel was added in the absence or presence of $NaBH_4$ solution respectively

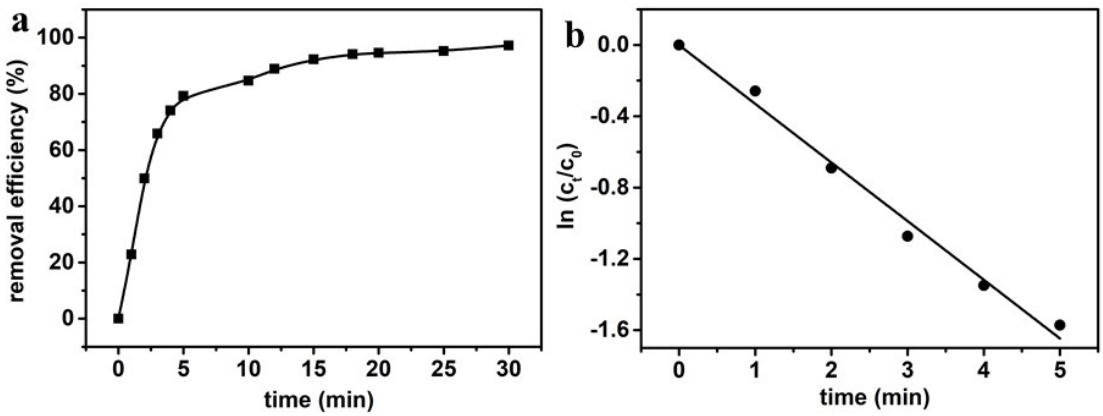

Figure S8. (a) Removal efficiency of MO; (b) Plot of $\ln(c_t/c_0)$ as a function of time