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Fabrication of Intelligent Photonic Crystal Hydrogel Sensors for Selective Detection of Trace Mercury Ions in Seawater

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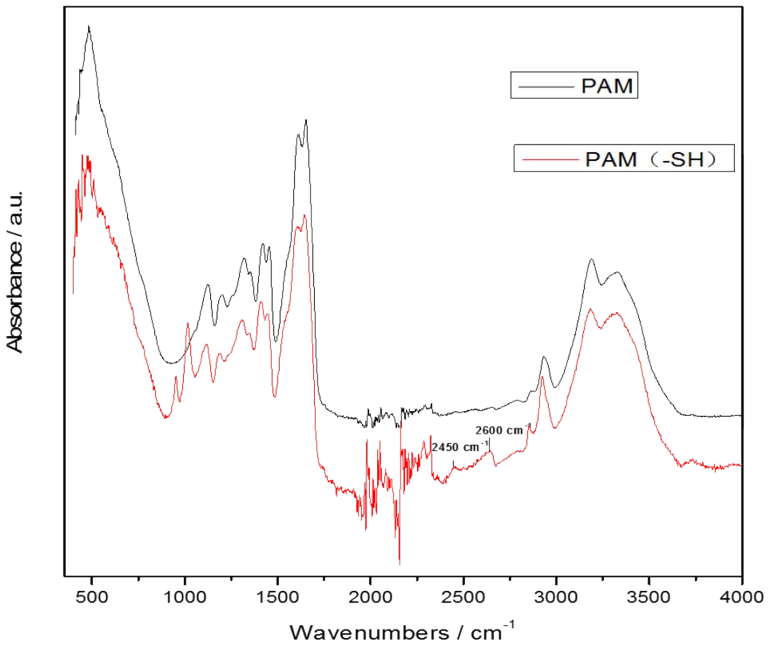

Fig. S1. FTIR spectra dired (a) pure polyacrylamide hydrogel and (b) functiolized polyacrylamide hydrogel with 8 wt% N, N'-cystaminebisacrylamide. In the hydrogel formation, N, N'-methylenebisacrylamide was used as croslinker, and the hydrogels were washed by deionized water before drying. In the spectrum of funtionalized hydrohel, we can celarly see the new vibration bands from S-H strecting in 2400-2650 cm^{-1} and from C-SH stretching in 950-1100 cm^{-1}, which confirms the existence of grafted -SH groups in the hydrogel.

Table S1. Average size and polydispersity of synthesized polystyrene nanoparticles in 1 mM KCl solution measured by dynamic light scattering method with a Brookhaven 90 plus PALS Zeta potential analyser.

Sample ID	Eff. Diam. (nm)	Polydispersity	Baseline Index
lxps - 1	96.55	0.002	9.2
lxps - 2	98.07	0.015	8.2
lxps - 3	98.79	0.001	8.9
Mean:	97.80	0.006	8.8
Std Err:	0.66	0.004	0.3
Std Dev:	1.14	0.008	0.5

Table S2. Zeta potential of synthesized polystyrene nanoparticles in 1 mM KCl solution measured by a Brookhaven 90 plus PALS Zeta potential analyser.

Sample ID	Zeta Potential (mV)	Mobility (µ/s)/(V/cm)	RMS Residual
PS - 1	-45.87	-3.58	3.8393e-02
PS - 2	-42.55	-3.32	7.8636e-02
PS - 3	-44.62	-3.49	5.4155e-02
Mean:	-44.35	-3.47	5.7062e-02
Std Err:	0.97	0.08	1.1708e-02
Std Dev:	1.68	0.13	2.0278e-02

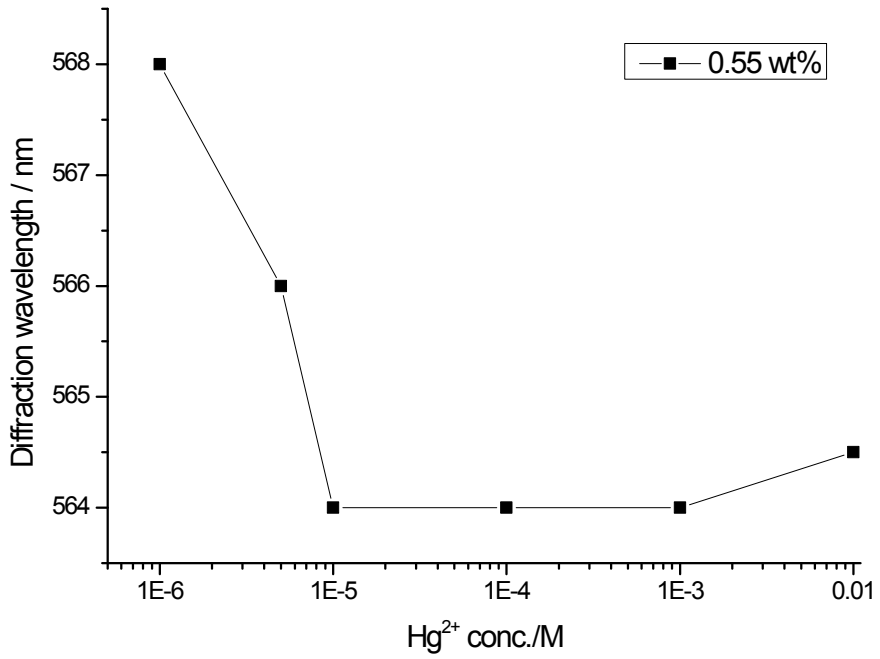

Fig. S2. Relationship between diffraction wavelength of hydrogel and concentration of Hg^{2+} ions at high concentration range in seawater. The hydrogel is functionalized by N, N' -cystaminebisacrylamide at 0.55 wt%. The interaction of -SH groups and Hg^{2+} ions has reached a threshold of saturation at the concentration of Hg^{2+} above $\sim 10^{-5}$ M and thus no further linear relationship exists between the diffracted wavelength and the bounded Hg^{2+} ions in the hydrogel.