

Electronic Supplementary Information

Ion strength assay via polyacrylate-ferriferrous oxide magnetic photonic crystals

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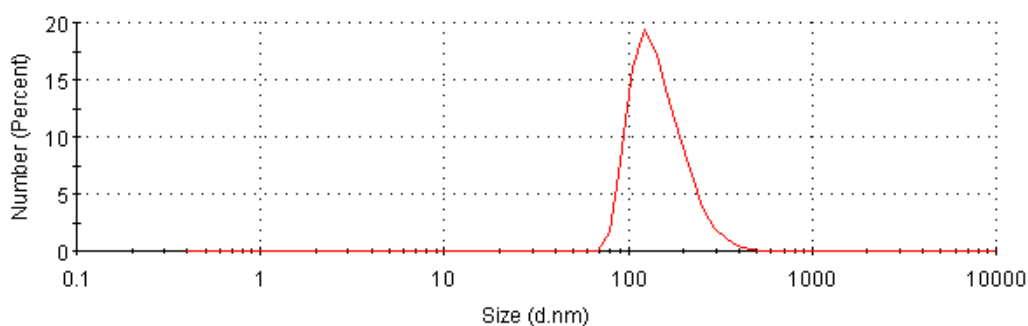


Fig. S1 Size distribution of PA-Fe₃O₄ nanoparticles by DLS (PDI = 0.167).

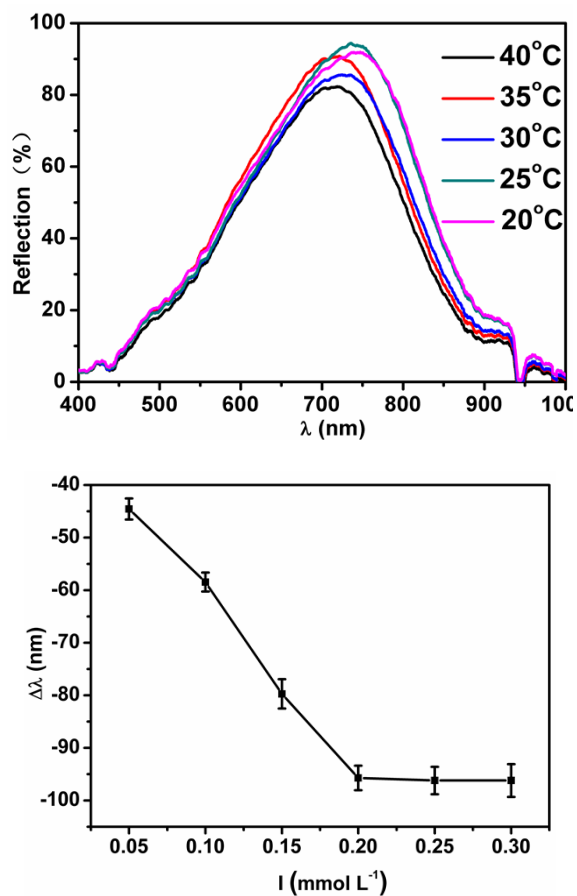


Fig. S2 The temperature effect on the reflection wavelength of MPCs (top) and the wavelength blueshifts of MPCs against I_{NaCl} at 30 °C (below).

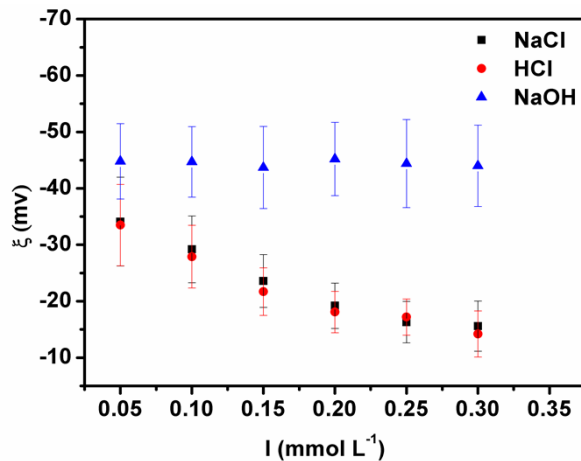


Fig. S3 Zeta potential of PA-Fe₃O₄ nanoparticles in the presence of NaCl, HCl and NaOH.

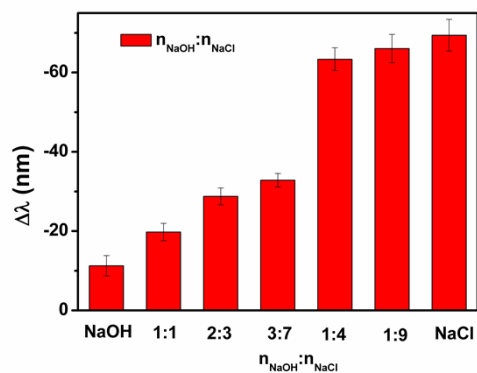


Fig. S4 The wavelength blueshifts of the MPCs in the solutions of NaOH and NaCl at different molar ratios (the experiment was done as follows: the IS of the NaOH/NaCl solution was kept at 10 mM in the molar ratio ($n_{\text{NaOH}} : n_{\text{NaCl}}$) of 1:1, 2:3, 3:7, 1:4 and 1:9, and 20 μL of the mixed solution was added into 1 mL of 4 mg mL⁻¹ PA-Fe₃O₄-MPCs solution and then the wavelength was measured).

Table S1 Comparison of this method to other methods reported in literatures

Materials	Principles	$\Delta\lambda$ /IS range	Measured ions	Respond time	References
PA-Fe ₃ O ₄ -MPCs	Electrolytes-induced zeta potential change causing wavelength shifts	90 nm/0.05- 0.30mM	NaCl, KCl, HCl, CaCl ₂ , MgCl ₂ , Na ₂ SO ₄	8 s	this method
PM-PCF	Swelling induced radial pressure change causing wavelength shifts	3.74 nm/ 0-5 M	NaCl	1 min	1
PCCA	pH and ionic strength-induced swelling of the polymers causing the change of Bragg diffraction wavelength	274 nm/ pH 2-11; 175 nm / 0-1 mM NaCl	pH, NaCl	10 min	2
PMCC	Salt-induced deswelling of the microgel particles in the film resulting in a smaller lattice constant of the film and an increased refractive index of the microgel particles.	357 nm/ 10-667mM	NaCl	114.5 s-150.3 s	3
PS-co- PCCA	Ionic strength induced shrinking and swelling of the polymers causing the change of Bragg diffraction wavelength	50 nm /0.1-10 m M	NaCl, Na ₂ SO ₄ , Na ₃ Cit	<1 s	4
Silica colloidal crystals	Swell or deswell in response to pH and ion strength, causing a change of Bragg diffraction	80 nm/pH3.67-10.87; 40 nm/0-1 M NaCl	pH, NaCl	unknown	5

$\Delta\lambda$: the change of spectra wavelength.

PM-PCF: polyimide-coated polarization-maintaining photonic crystal fiber (PM-PCF) Sagnac interferometer

PCCA: polyacrylamide hydrogel combined with polystyrene crystalline colloidal array (CCA).

PMCC: acrylic acid modified poly(N-isopropylacrylamide) combined with 2-hydroxyethyl methacrylate using N-(3-dimethylamino)propyl-N'-ethylcarbodiimide hydrochloride (EDC) forming the polymerized microgel colloidal crystals.

PS-co- PCCA: Poly(styrene-co-sodium styrenesulfonate) nanoparticles combined with polyacrylamide hydrogel based polymerized colloidal crystal array film

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