Supporting Information for:

Uniform Core-shell Photonic Crystal Microbeads as Microcarriers for Optical Encoding

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Supporting Table and Figures:

Table S1. Characteristics of PS-PNIPAm NPs with different sizes at 25 °C.

	NP-1	**NP-2**	**NP-3**
[a] $D_{\text{dry size}}$ (nm)	122 ± 4	139 ± 5	178 ± 3
[b] $D_{\text{hydrodynamic size}}$ (nm)	135.1	149.9	193.8
[c] PDI	0.018	0.023	0.020
Zeta potential (mv)	-25.7	-24.5	-29.8

Note: [a] $D_{\text{dry size}}$ represents diameter of the PS-PNIPAm NPs in the dry state, which was obtained by measuring 100 NPs from SEM images. [b] $D_{\text{hydrodynamic size}}$ denotes hydrodynamic diameter of the PS-PNIPAm NPs in aqueous solution which was obtained from DLS measurement. [c] PDI represent the polydispersity index of the PS-PNIPAm NPs which was obtained from DLS measurement.

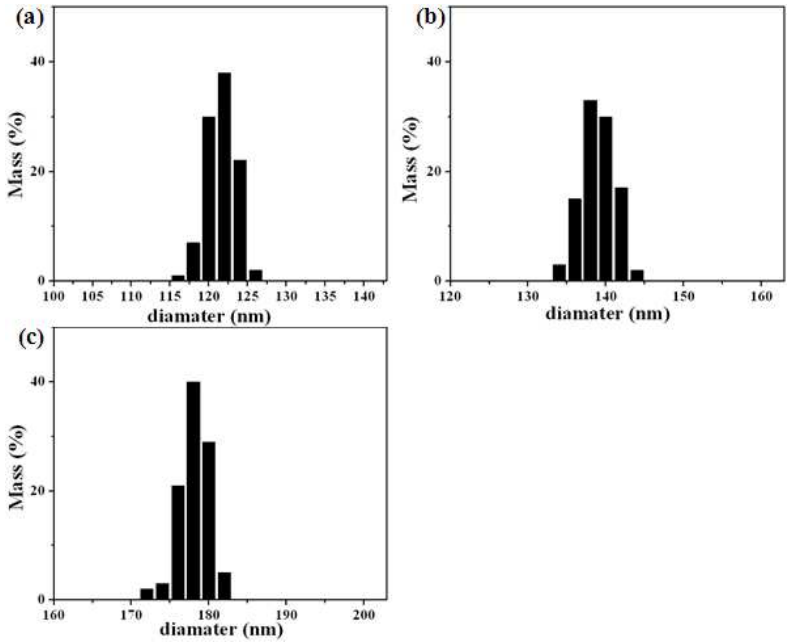

Figure S1. Size distribution of PS-PNIPAm NPs with size of (a) 122 ± 4 nm , (b) 139 ± 5 nm and (c) 178 ± 3 nm, respectively. The data was obtained from DLS measurement.

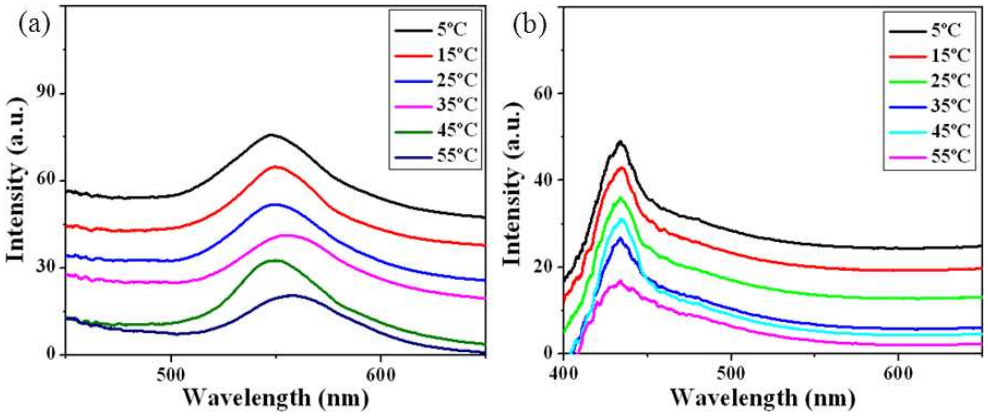

Figure S2. Reflection spectra of green (a) and blue (b) core-shell PC microbeads with varied temperature ranging from 5 to 55 °C. Clearly, the core-shell PC microbeads display good stability of reflection peaks when varying temperature.

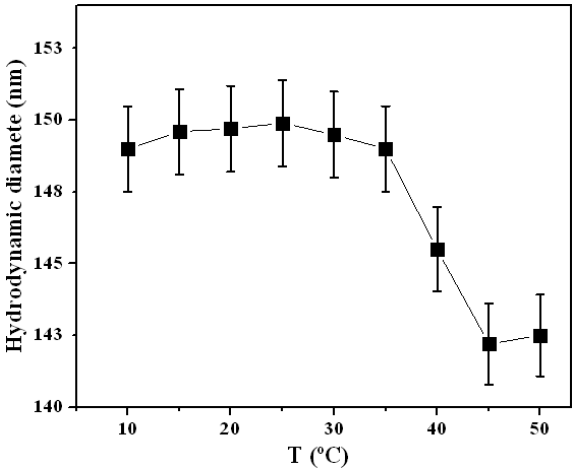

Figure S3. Hydrodynamic diameter versus temperature for 139 nm PS-PNIPAm NPs, showing the LCST of ~ 35 °C. The hydrodynamic diameter of the NPs was measured by dynamic light scattering (DLS). A standard goniometer setup (ALV, Langen) was used to perform DLS measurements at various scattering angles. The sample temperature was adjusted using a thermostated toluene bath acting as a temperature and refractive index–matching bath. The temperature was controlled by a PT100 thermoelement, which was placed in the toluene bath close to the sample position. This provided stability in temperature of ± 0.1 K. The performed laser was a frequency–doubled Nd:YAG laser (Compass Series, Coherent) with λ 532 nm providing a constant output power of 150 mW. The recorded intensity time autocorrelation functions were analyzed by inverse Laplace transforms (ILT) using the program CONTIN.

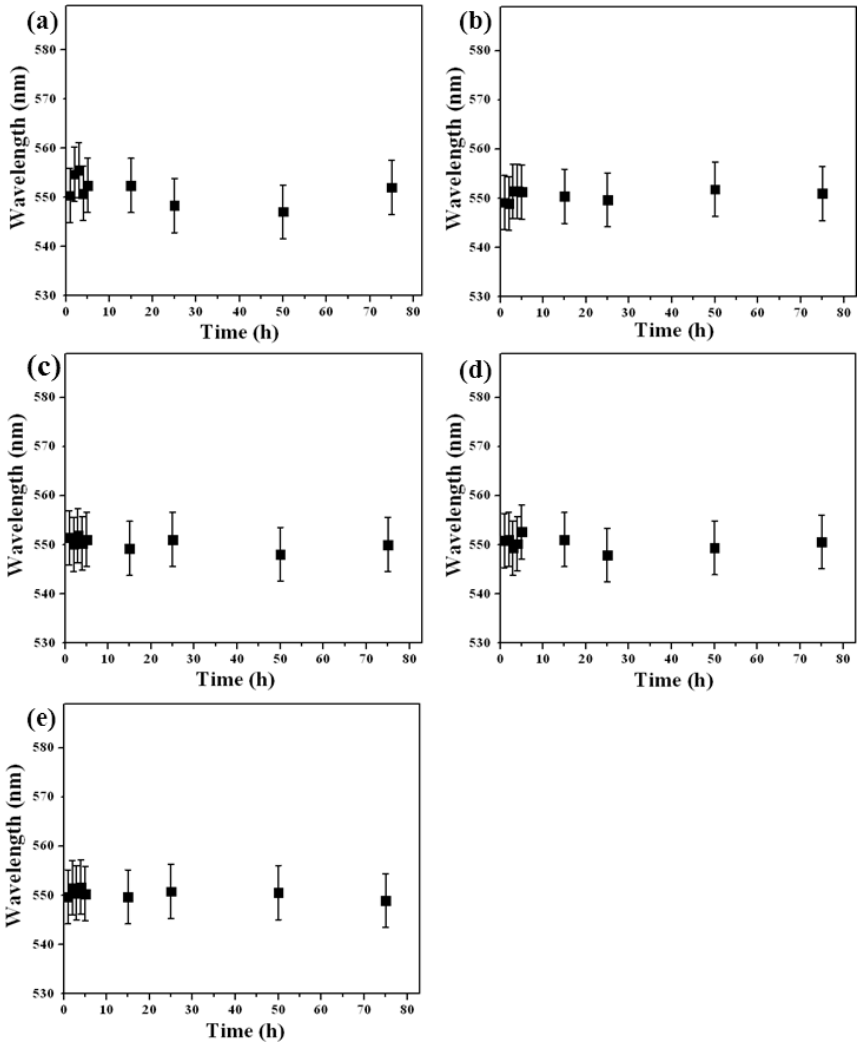

Figure S4. (a, b) Diffraction peak position of green core-shell PC microbeads immersed in aqueous NaCl solution with different concentrations: (a) 0.1 M, (b) 1 M, with different time ranging from 1 to 72 h. (c-e) Reflection spectra of the core-shell PC microbeads immersed in aqueous solution with different pH value: (c) pH=7, (d) pH=1, (e) pH=13 with different time ranging from 1 to 72 h.

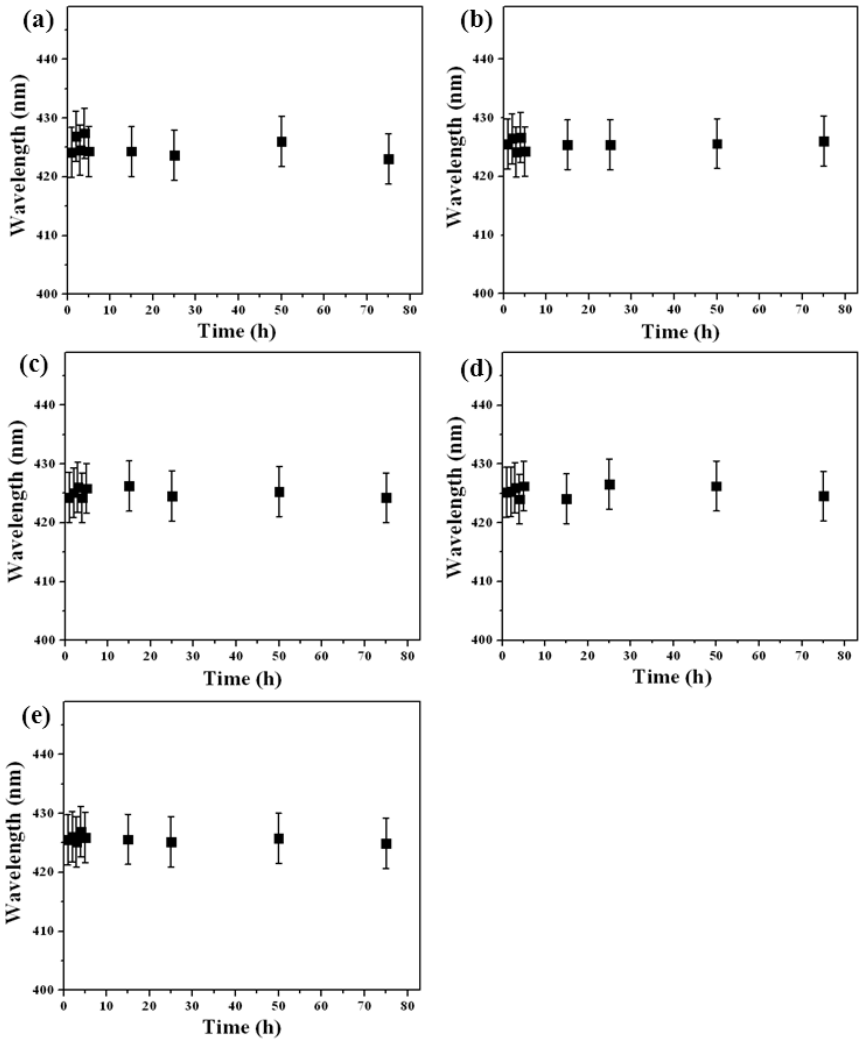

Figure S5. (a, b) Diffraction peak position of blue core-shell PC microbeads immersed in aqueous NaCl solution with different concentrations: (a) 0.1 M, (b) 1 M with varied time ranging from 1 to 72 h. (c-e) Reflection spectra of core-shell PC microbeads immersed in aqueous solution with different pH value: (c) pH=7, (d) pH=1, (e) pH=13 with different time ranging from 1 to 72 h.

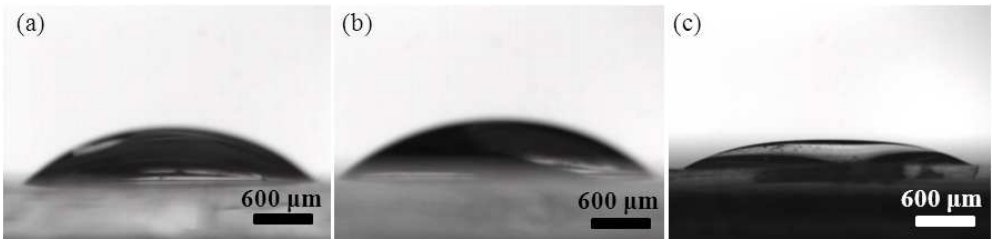

Figure S6. Photographs showing the shape of water droplets on different films: (a) ETPTA with a water contact angle (CA) of 17.5±1.2°, (b) ETPTA and BA ETPTA with a water CA of 16±1.2°, (c) modified ETPTA and BA with a water CA of 6.5± 1.2°.

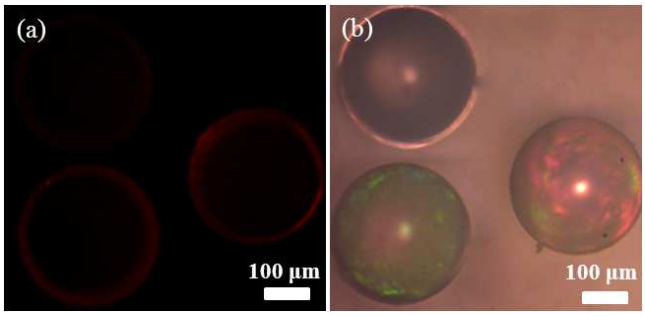

Figure S7. Reflection (a) and fluorescence (b) microscopy image of three PC microbeads after incubation with an analyte containing FITC-tagged goat antihuman IgG and FITC-tagged goat antipig IgG, indicating that fluorescence-labeled protein interacts specifically with its probe molecule on the surface of PC microbeads.