Supporting Information

Inverse Opal Hydrogel Sensor for the Detection of pH and Mercury Ion

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Fig. S1 shows the transmission spectra of two polystyrene (PS) colloidal crystal templates. The diffraction wavelength of green and orange samples locates at 550 nm and 618 nm, respectively. The green line template is composed of 250 nm PS nanospheres, and the orange line template is composed of 263 nm PS nanospheres.

Fig. S2 shows the transmission spectra of three inverse opal hydrogels (IOHs). IOH2 (250 nm) refers to the IOH constructed by using photoresist 2 and a PS colloidal crystal template with 250 nm PS nanospheres. Similarly, IOH1 (263 nm) and IOH2 (263 nm) are prepared by using PS colloidal crystal template with 263 nm PS nanosphere, and photoresist 1 and 2, respectively. The diffraction wavelength of IOH2 (250 nm), IOH2 (263nm) and IOH1 (263 nm) locates at 450, 474 and 483 nm, respectively. It is obvious that the diameter of PS nanospheres plays an important role in determining the diffraction wavelength of the IOHs.

Fig. S3 shows the pH responsive behavior of the IOHs with different components. In Fig. S3a, diffraction wavelength of IOH1 (263 nm) in deionized water locates at 622 nm light. As the pH increases from 6.3 to 11.5, the diffraction wavelength of IOH red shifts slightly. However, the red shift of the diffraction wavelength shows a dramatic increase as the pH changes from 11.5 to 12. From pH 12 to 12.5, the diffraction wavelength red shifts slightly again. The responsive behavior of IOH2 (263 nm) is analogous to IOH1 (263 nm). Nevertheless, responsive curve of IOH2 (263 nm) shows a gentle slope compared to IOH1 (263 nm). The difference is attributed to the high content of carboxyl groups in IOH2 (263 nm). More recognition groups lead to more electrostatic repulsion and swell. Therefore, IOH2 (263 nm) has broad range of pH compared to IOH1 (263 nm). The insets are photographs of the IOHs in aqueous solution with different pH, which shows the color change of IOH1 (263 nm) and IOH2 (263 nm), respectively.

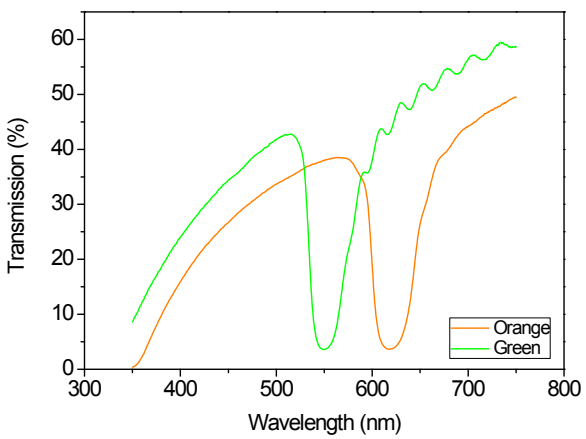

Fig. S1. Transmission spectra of the PS colloidal crystal templates.

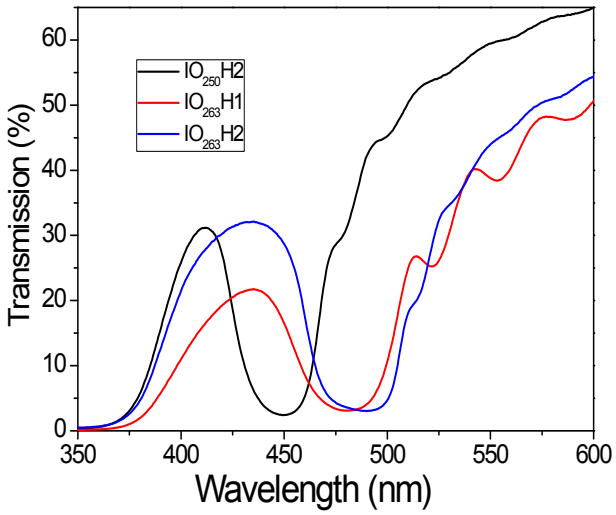

Fig. S2. Transmission spectra of IOHs.

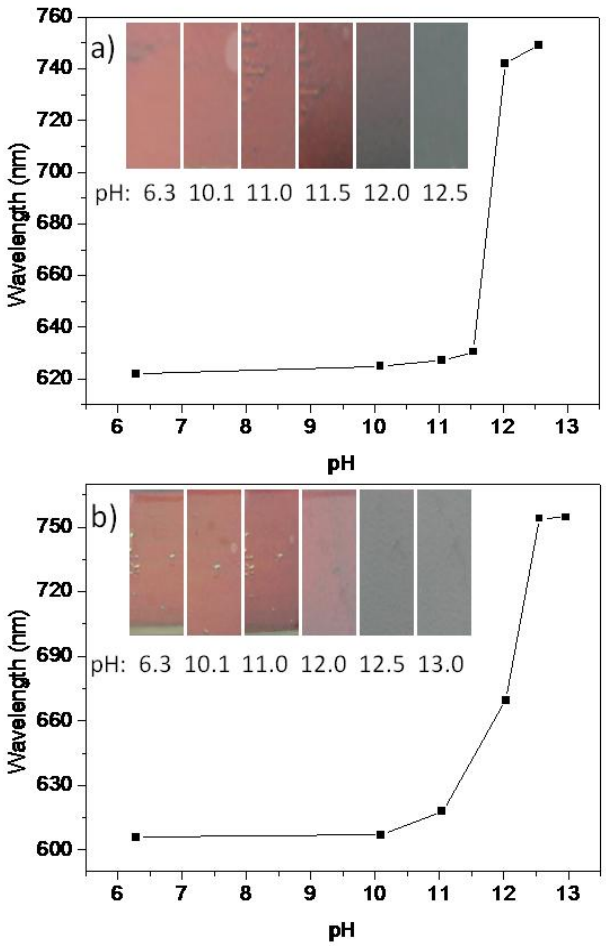

Fig. S3. Responsive behavior of a) IOH1 (263 nm), b) IOH2 (263 nm) to pH. Insets are the corresponding photographs showing the color change of the IOHs responding to pH.