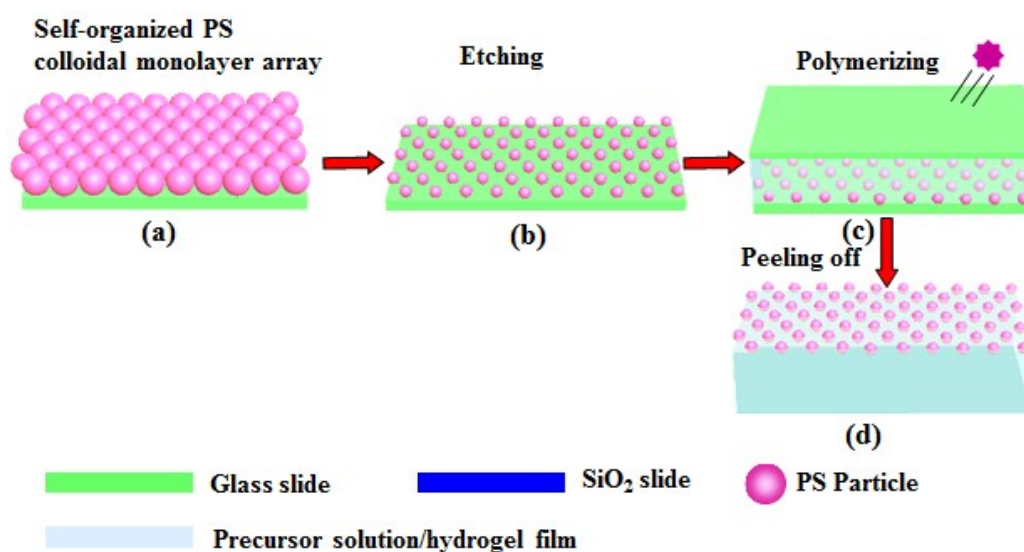


Supporting Information

## Functional Hydrogel Film Attached with 2D Au Nanosphere Array and Its High Optical Diffraction Intensity as a Sensor

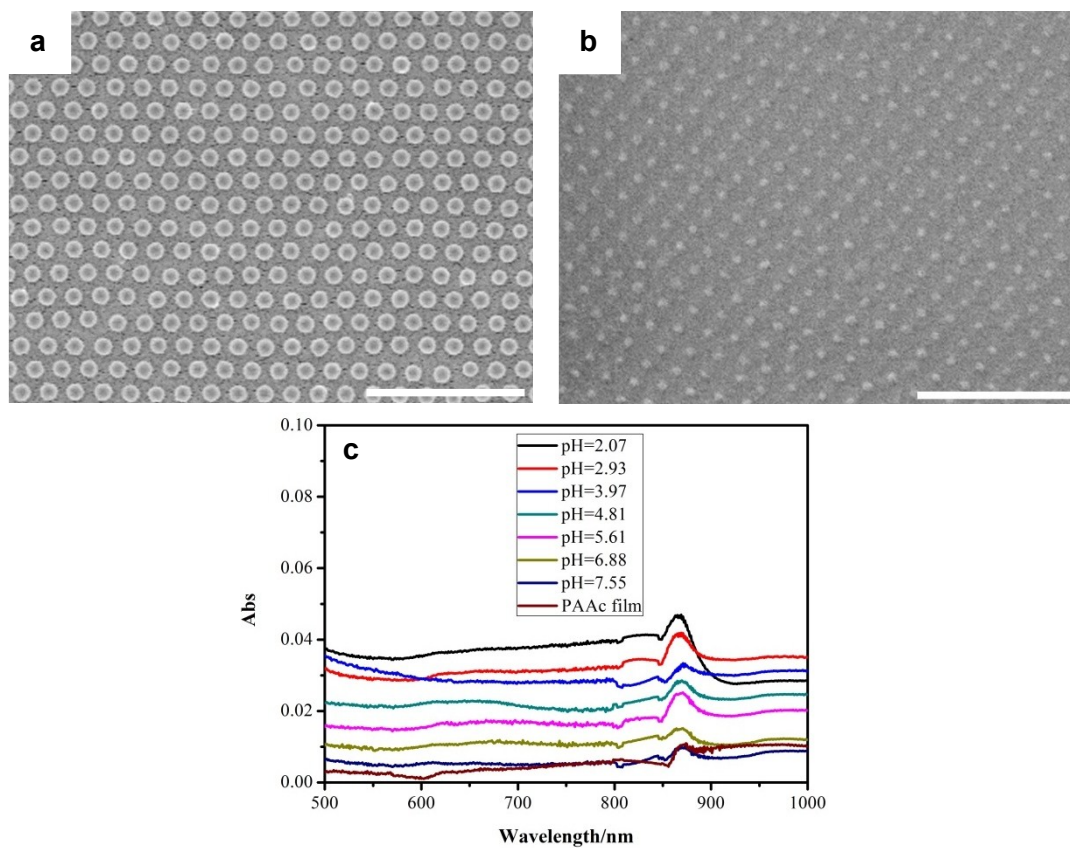
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As a comparison, the 2D PS hncp microsphere array/hydrogel composite sensing films were also prepared. Briefly, the 2D PS hncp array was etched to form 2D PS hncp array with the similar diameter and periodicity to 2D Au array by RIE, and then followed by polymerizing, peeling off and washing with deionized water (as shown in Fig. S1).



**Fig. S1** Preparation of 2D PS hncp microsphere array/hydrogel film composite sensing film: a. 2D PS hncp microsphere array was formed on a cleaned glass slide; b. PS hncp array with the similar diameter and periodicity to Au nanosphere array was fabricated by RIE; c. Precursor solution was cast on the PS hncp

array and polymerized by UV light; d. A free standing 2D PS hncp array/CS hydrogel composite film was obtained by peeling off from glass slides and washed with a lot of deionized water.



**Fig. S2** (a) SEM image of 2D hncp PS microsphere array; (b) SEM image of 2D hncp PS microsphere array/hydrogel composite film; the scale bar are 2  $\mu\text{m}$  in (a) and (b). (c) Absorption spectra of 2D hncp PS microsphere array/hydrogel composite film at pH value: 2.07, 2.93, 3.97, 4.81, 5.61, 6.88, 7.55 and hydrogel film without 2D hncp PS microsphere array.