Supporting Information

Bioinspired colloidal crystals hydrogel pressure sensors with Janus wettability for uterus cervical canal tension perception

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Supporting Figures

Figure S1. Hydrogel scaffolds remain well adherent under pressure.

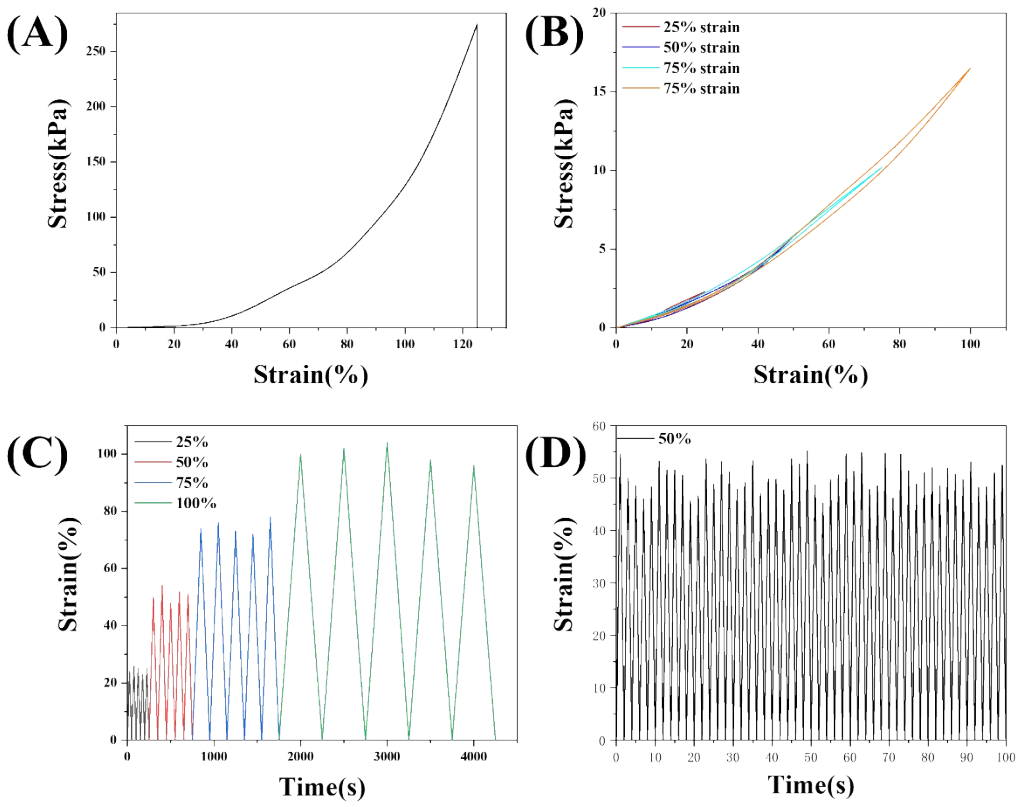

Figure S2. Tensile strain curves of hydrogel sensors. (A) Relationship between the tensile force and deformation required to pull the hydrogel sensor to fracture. (B) Deformation curves of hydrogel sensors under different tensile forces. (C) Deformation degree curve of hydrogel under different tensile force for many times stretching. (D) Curves of hydrogel stretching under a large number of experiments.

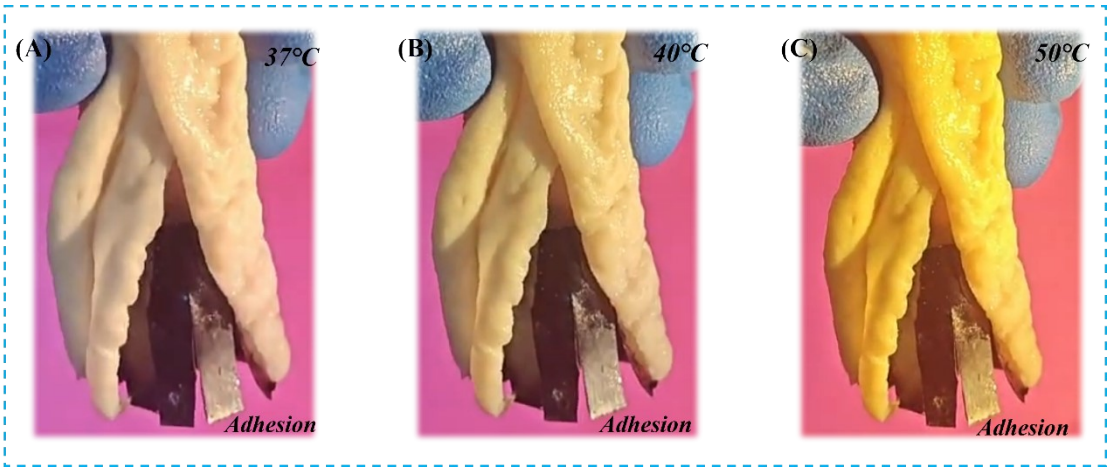

Figure S3. Hydrogel scaffolds remain well adherent under the action of different temperatures. (A) 37°C. (B) 40°C. (C) 50°C.

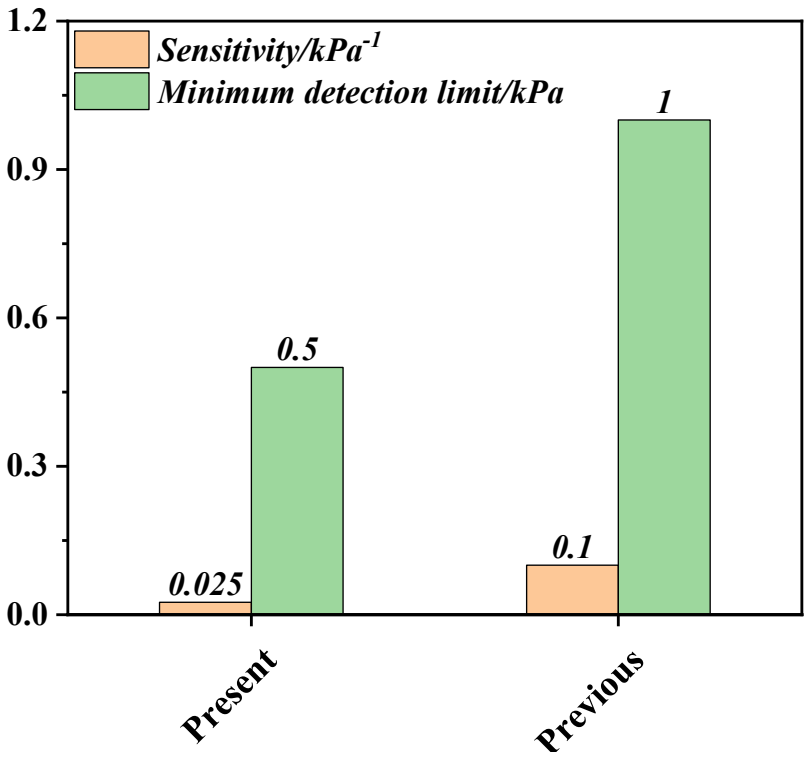

Figure S4. Comparison of sensitivity and minimum detection limit of hydrogel pressure sensors with previous work.

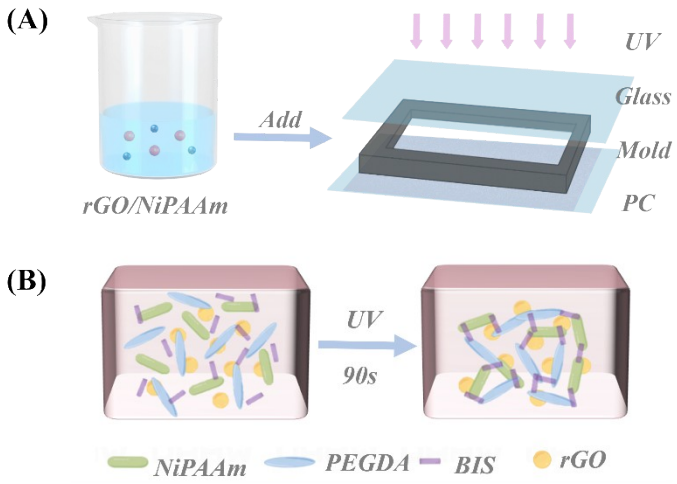

Figure S5. (A) Method of making hydrogels. (B) Components of hydrogels.

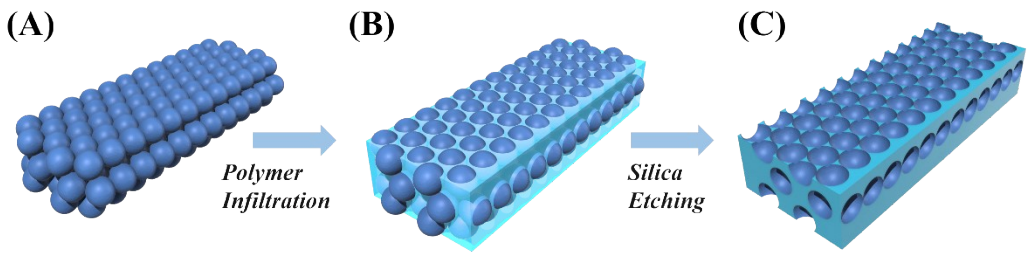

Figure S6. Schematic representation of the preparation of anti-opal structured colour films. (A) Opal template. (B) Polymer-permeable opal template. (C) Independent anti-opal structure.

(A) **(B)**

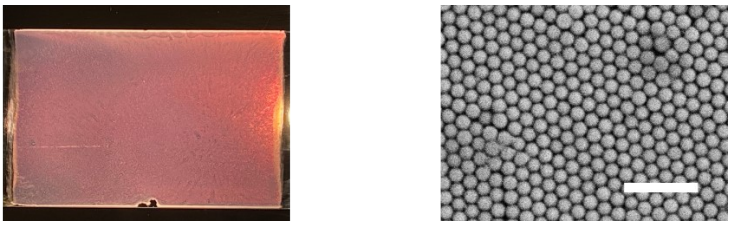

Figure S7. (A) Self-assembly of silica nanoparticles accomplished by horizontal deposition. (B)The SEM image of the colloidal crystal template, scale bar: 1um.

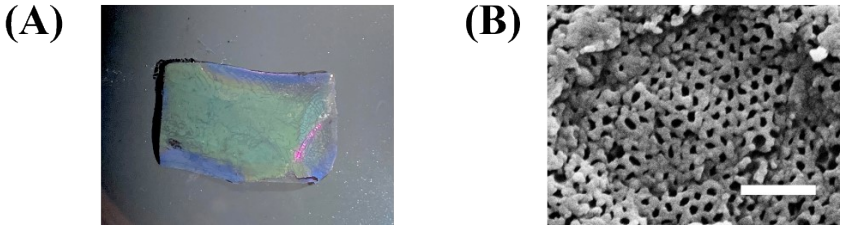

Figure S8. (A) Optical images of hydrogel films of photonic crystals with anti-opal structure. (B)The SEM image of the inverse-opal structured hydrogel film, scale bar: 1um.

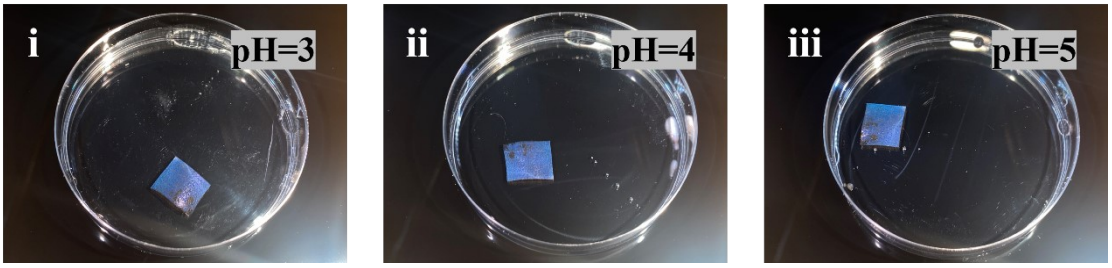

Figure S9. The ambient temperature was set at 37 ℃, and the hydrogel films were immersed in aqueous citric acid solutions with pH values of 3,4,5, respectively, with no notable changes in color or size.

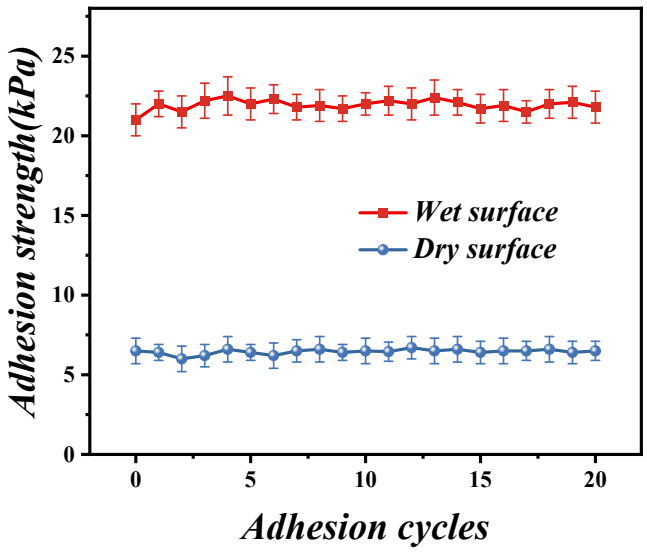

Figure S10. Schematic diagram of the test results of adhesion performance of hydrogel film scaffolds on the surface of artificial cervix at different humidity. In this experiment, the effect of humidity on adhesion was quantitatively analyzed through 20 cycles of adhesion and peeling process. When the surface of the artificial cervix was kept wet, the adhesion force of the hydrogel film scaffold was stable at about 22 kPa; while in the dry state, the adhesion force decreased to about 6.5 kPa.

Movie S1

Video of adhesion testing of catheter-based pressure transducers decorated with composite hydrogel scaffolds. The sensor is placed into a moist artificial cervix that mimics a healthy cervix, and the artificial cervix is wiggled up and down without the sensor becoming ectopic or displaced.

Movie S2

Video of adhesion testing of catheter-based pressure transducers decorated with composite hydrogel scaffolds. A citric acid solution with a pH of 3 was used to simulate the passage of biological fluids on the surface of the cervical tissue, and neither the hydrogel scaffold nor the catheter became ectopic or displaced when the solution dripped.