Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Electronic Supplementary Information

Biocompatible, self-adhesive, and stretchable photonic crystal sensor for underwater motion detection

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Table S1 The components of precursor for fabricating various PC sensors with different PEI*

Serial	AM (mg)	APA (mg)	X	PEI_X (mg)	Graphene (mg)	BIS (mg)	DEAP (μL)
#1	319.9	109.6	600	35.3	0.79	0.23	2.8
#2	319.9	109.6	1800	35.3	0.79	1	2.8
#3	319.9	109.6	10000	35.3	0.79	2	2.8
#4	319.9	109.6	70000	35.3	0.79	3	2.8

* The PEI with molecular weight of X is labeled as PEI_X.

Table S2 The components of precursor for fabricating various PC sensors with different BIS, graphene and APA content.

Serial	AM (mg)	APA (mg)	PEI_{70000} (mg)	Graphene (mg)	BIS (mg)	DEAP (μL)
#1	319.9	109.6	35.3	0.79	0.23	2.8
#2	319.9	109.6	35.3	0.79	1	2.8
#3	319.9	109.6	35.3	0.79	2	2.8
#4	319.9	109.6	35.3	0.79	3	2.8
#5	319.9	109.6	35.3	0.51	0.23	2.8
#6	319.9	109.6	35.3	0.28	0.23	2.8
#7	319.9	109.6	35.3	0	0.23	2.8
#8	355.4	0	35.3	0.79	0.23	2.8

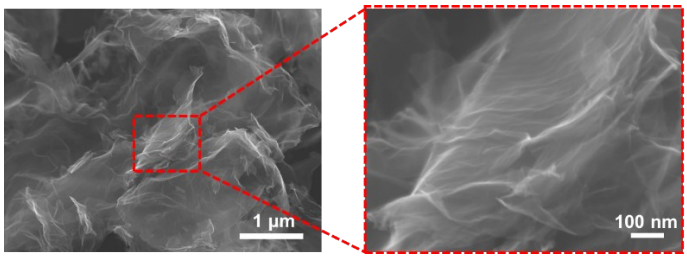

Fig. S1 SEM images of the graphene powder.

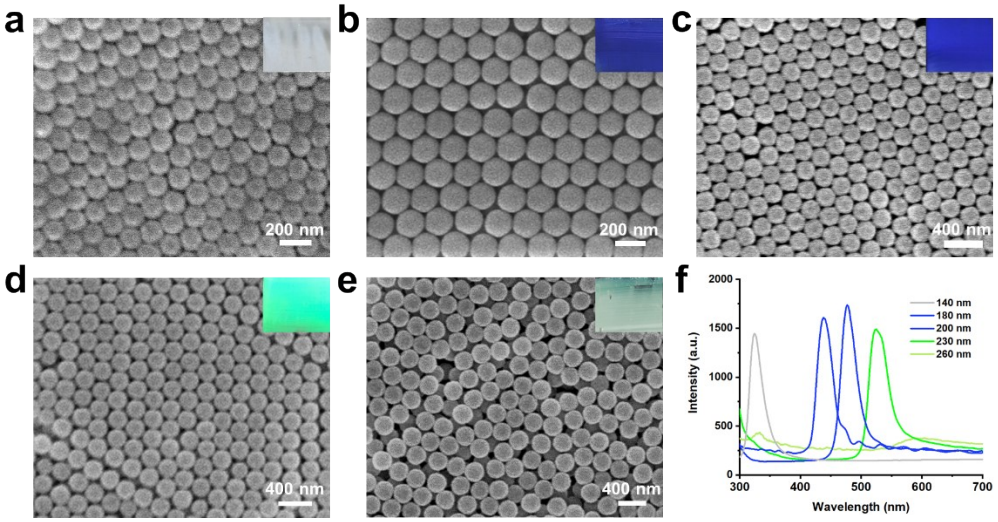

Fig. S2 (a-e) SEM images of 3D-PMMA arrays with particle sizes of 140 nm, 180 nm, 200 nm, 230 nm, and 260 nm, respectively, and (f) its corresponding reflection spectrums.

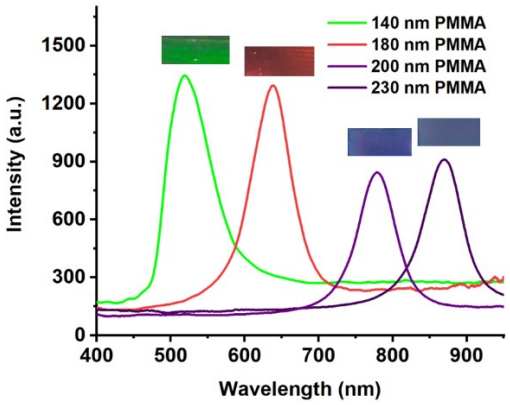

Fig. S3, The reflection spectrums and structural colors of fully swollen PC sensors with different PMMA nanoparticles (140 nm, 180 nm, 200 nm, and 230 nm).

Fig. S3 shows that the PC sensors with 140 nm and 200 nm PMMA nanoparticles can reflect green and red light respectively, which is beneficial for naked eye observation when the sensors are applied as visual sensing device. Among them, the red PC sensor with 180 nm PMMA is more suitable for being applied as wearable visual device due to the blue-shift of the stretched PC sensor. The PC sensors with 200 nm and 230 nm PMMA were almost black since its reflection wavelength were located in the near-infrared region. PMMA nanoparticles with larger particle size (260 nm) was difficult to arrange into ordered structure, which have no value for further fabrication into PC sensor.

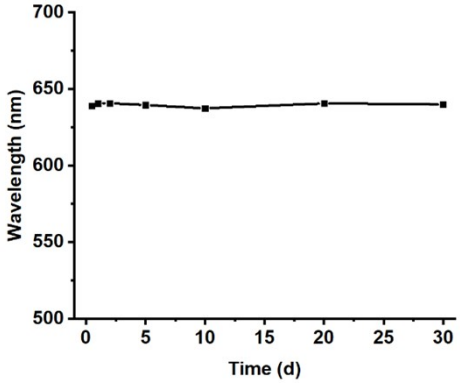

Fig. S4 Changes in the reflection spectrum peak of the wearable PC sensor in water over time.

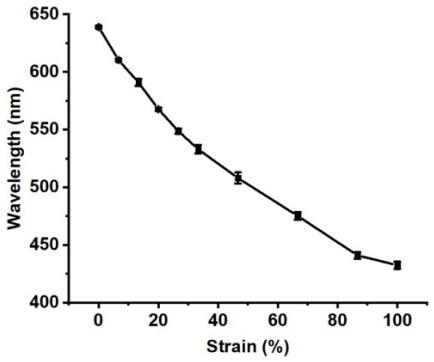

Fig. S5 Changes in the reflection spectrum peaks of the PC sensors under ever-increasing strain .

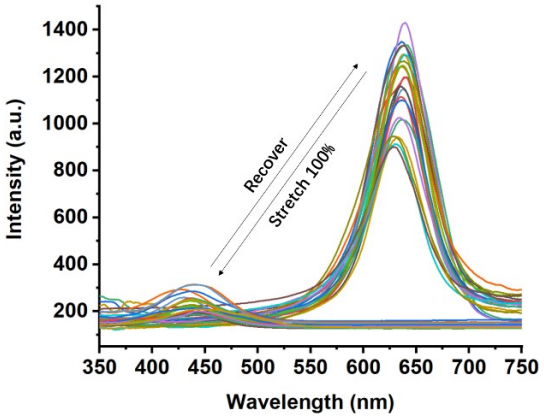

Fig. S6 Reflection spectrums of the PC sensor in the repeated stretching/releasing process of 10000 cycles, where the reflection spectrums were recorded every 500 times.

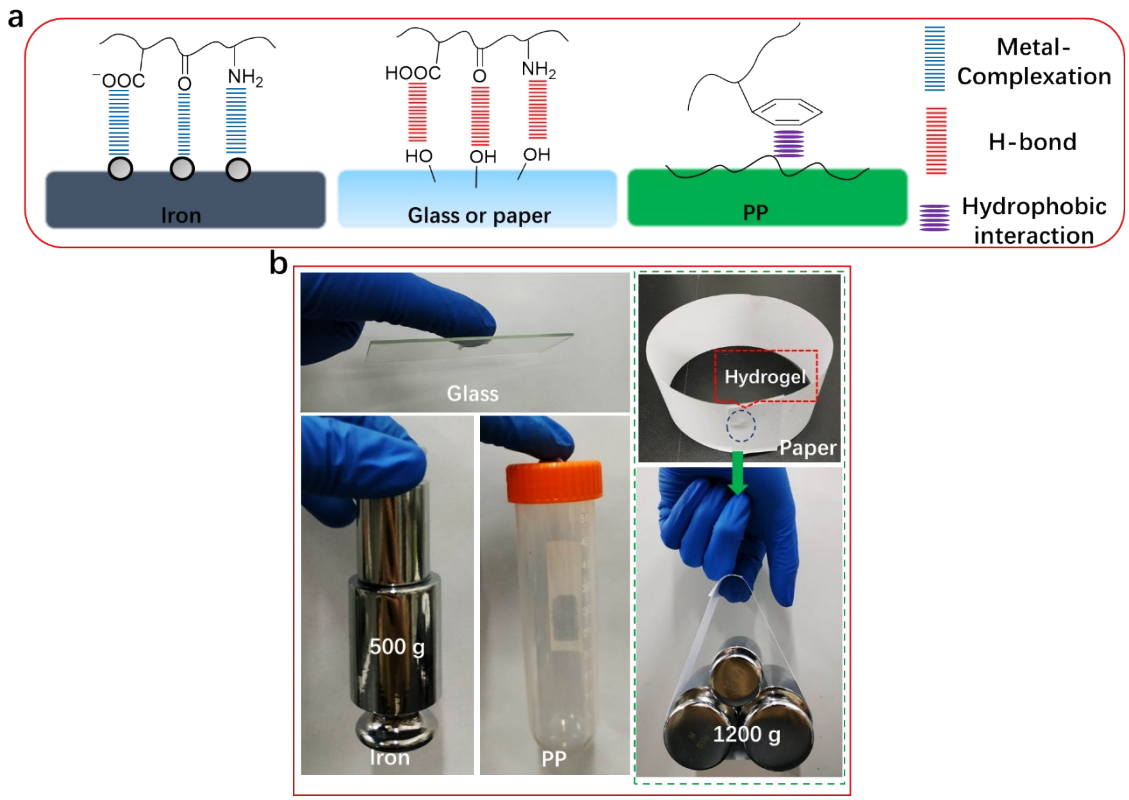

Fig. S7 (a) Schematic illustrations of PC sensors adhered to iron, glass, paper, and PP through various intermolecular interactions, and (b) the corresponding photographs.