Electronic Supplementary Material (ESI) for Materials Advances.

Electronic supplementary information

Facile Preparation of Amorphous Photonic Structure towards Rapid Temperature Sensing and Antibacterial Textile

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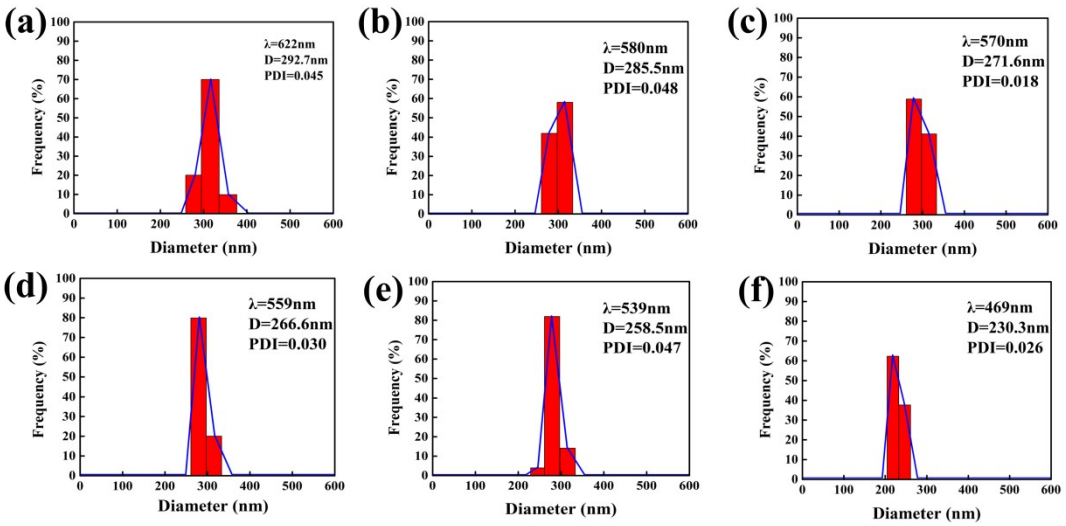

Figure S1. (a-f) Particle size distributions of P(St-BA-MAA) colloidal particles.

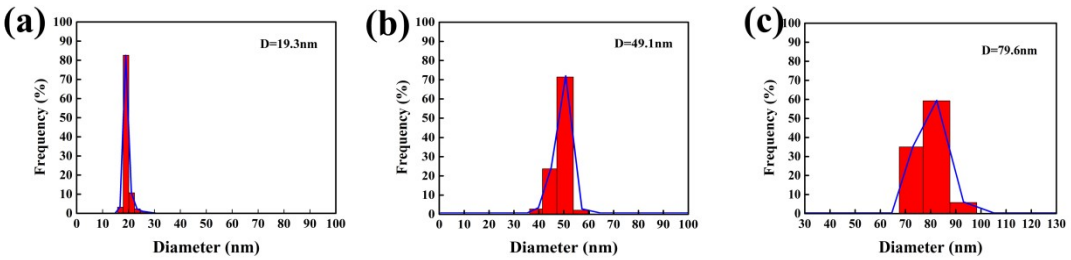

Figure S2. (a-c) Particle size distributions of silver nanoparticles.

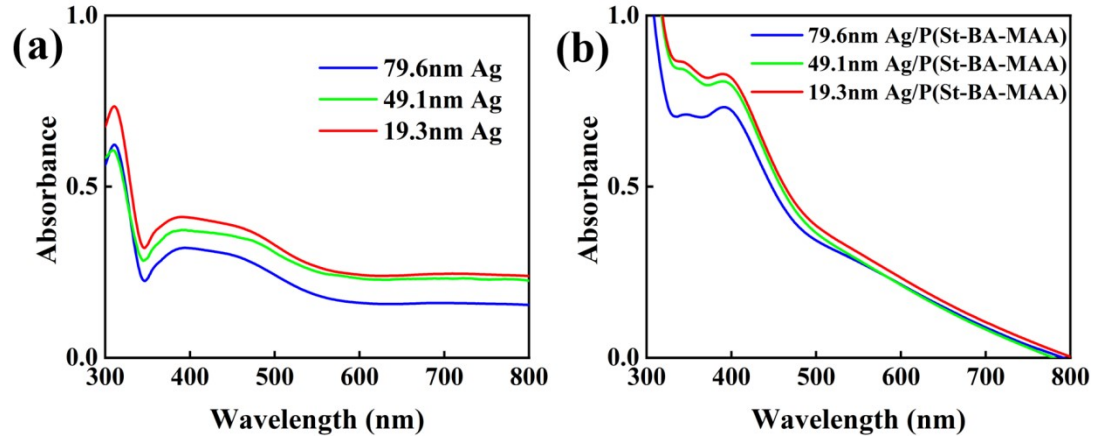

Figure S3. (a) Absorption spectra of Ag NPs powders. (b) Absorption spectra of mixtures of Ag/P(St-BA-MAA) with concentration both at 0.01wt%.

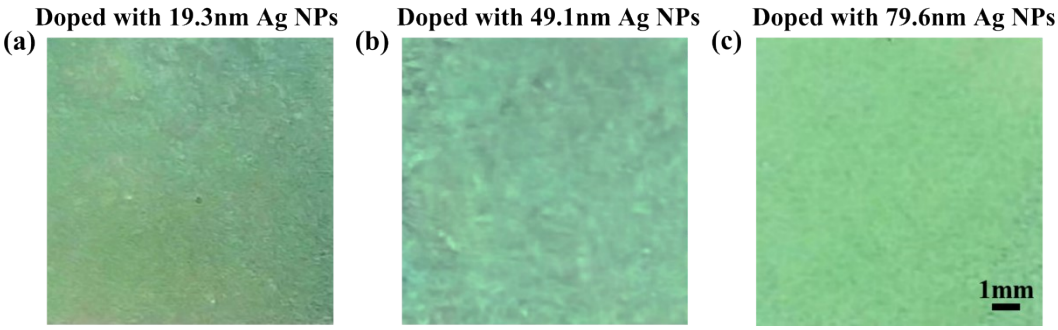

Figure S4. Photos of APS films doped with Ag NPs with diameter of (a)19.3 nm, (b) 49.1 nm, and (c) 79.6 nm, respectively.

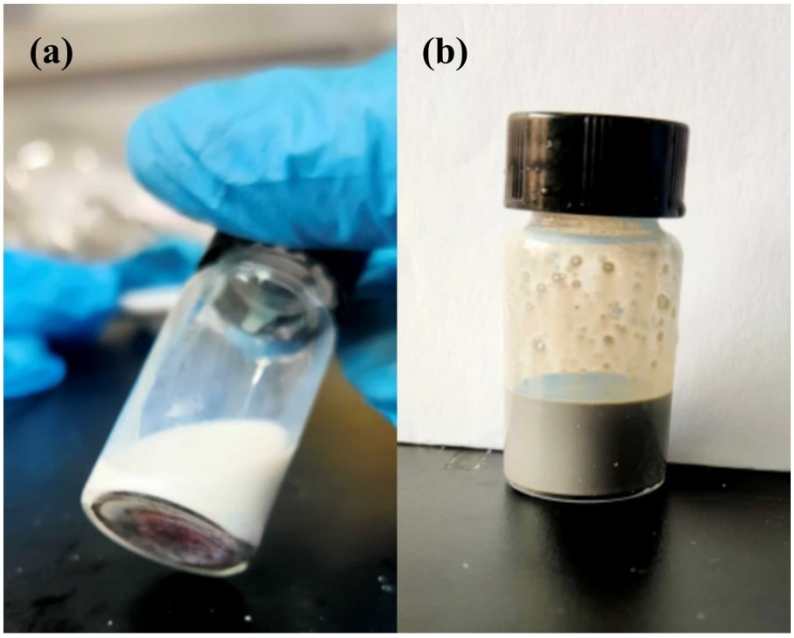

Figure S5. (a) Mixed emulsion of Ag NPs and colloidal particles without surfactant. (b) Mixed emulsion of Ag NPs and colloidal particles with surfactant.

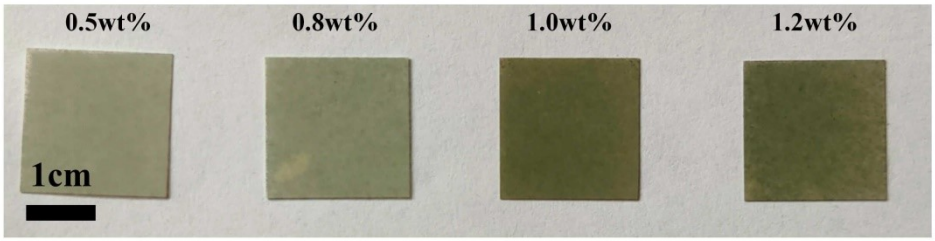

Figure S6. Comparison of structural color when the doping amount of Ag NPs is 0.5wt%, 0.8%, 1.0wt% and 1.2wt%.

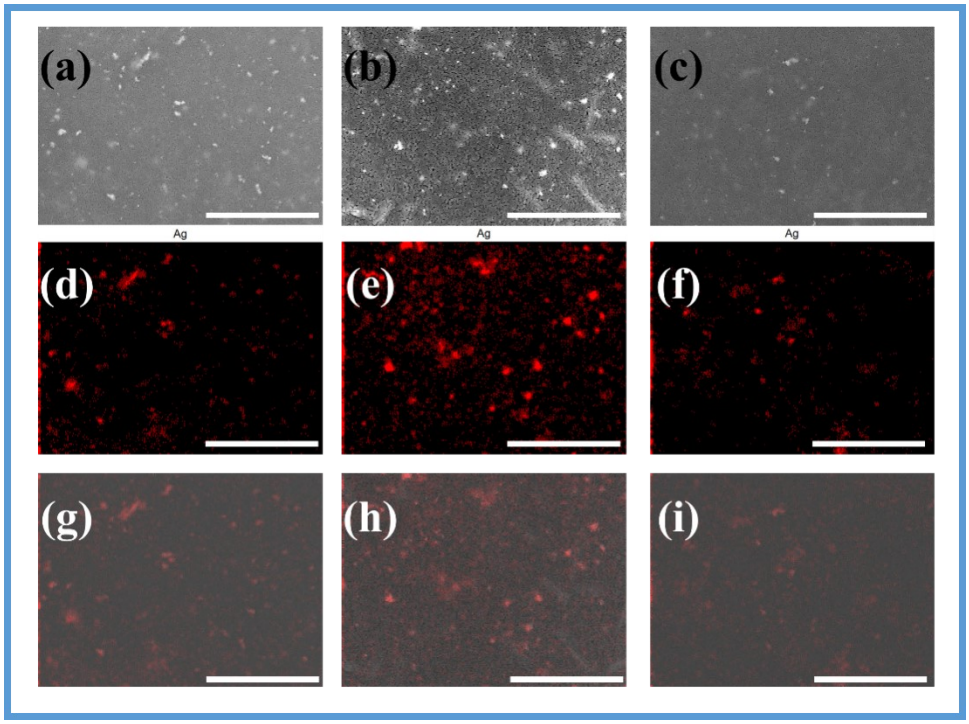

Figure S7. SEM images of (a) blue (b) green and (c) red APS film obtained by spray-coating method. (d-f) Element mapping for Ag in the APS films of (a-c) and their merged pictures (g-i). Scale bar: 10 μm.

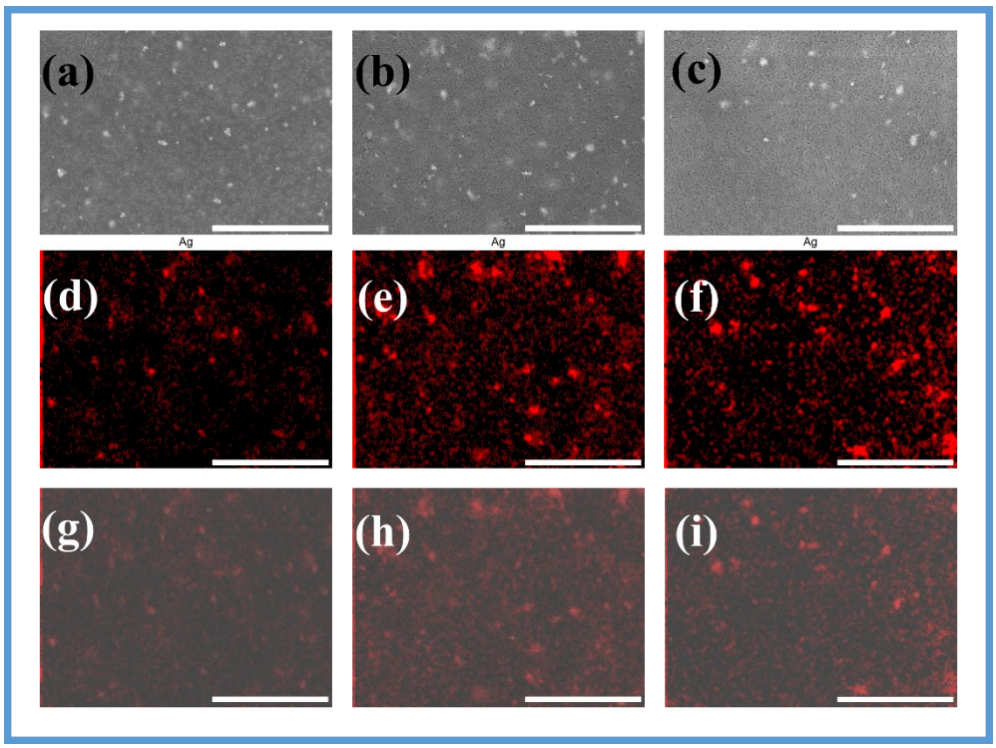

Figure S8. SEM images of (a) blue (b) green (c) red APS film obtained by hand-writing method. (d-f) Element mapping for Ag in the APS film of (a-c) and their merged pictures (g-i). Scale bar: 10 μm.

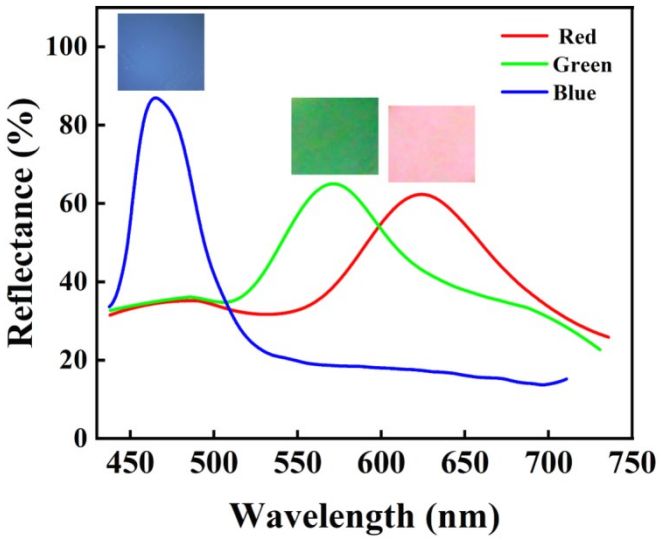

Figure S9. Reflection spectra of photonic crystal films composed of single particles.

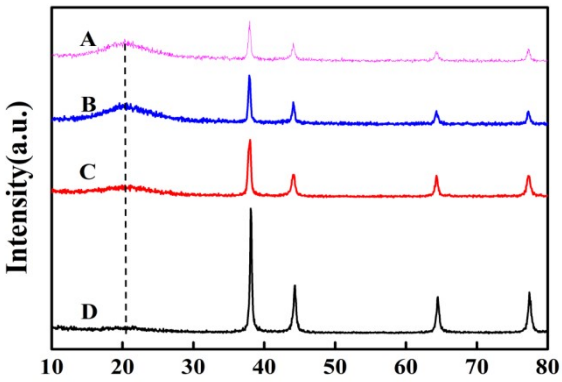

Figure S10. XRD diagram. A: APS/Ag film powder placed in air for 5 days; B:Ag NPs powder placed in air for 5 days; C: newly prepared APS/Ag film powder; D: fresh Ag NPs powder.

We conducted a group of XRD tests about fresh Ag NPs powder, Ag NPs placed in air for 5 days, APS/Ag film placed in air for 5 days, and newly prepared APS/Ag film to examine whether the Ag NPs oxidized. We found that distinct diffraction peaks at 38.2°, 44.4°, 64.5°, 77.5° appeared in all the XRD patterns of the four samples, which were indexed to the (111), (200), (220) and (311) reflections of Ag NPs. The new broad peak at 22° for the samples of APS/Ag attributed to the amorphous structure of the polymer[1,2]. No diffraction peaks attributed to Ag_2O were presented, suggesting that Ag NPs played a decisive role in improving the structural color saturation of the APS films.

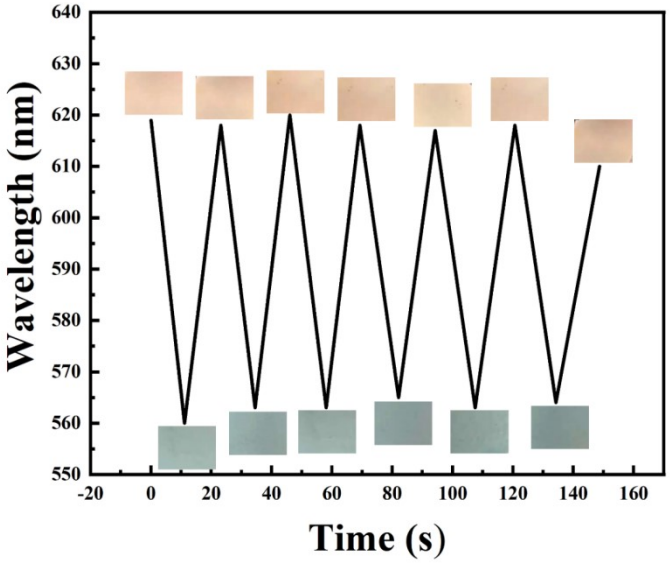

Figure S11. Six cycle diagram of hydrogel temperature sensor at 24 ºC and 38ºC.

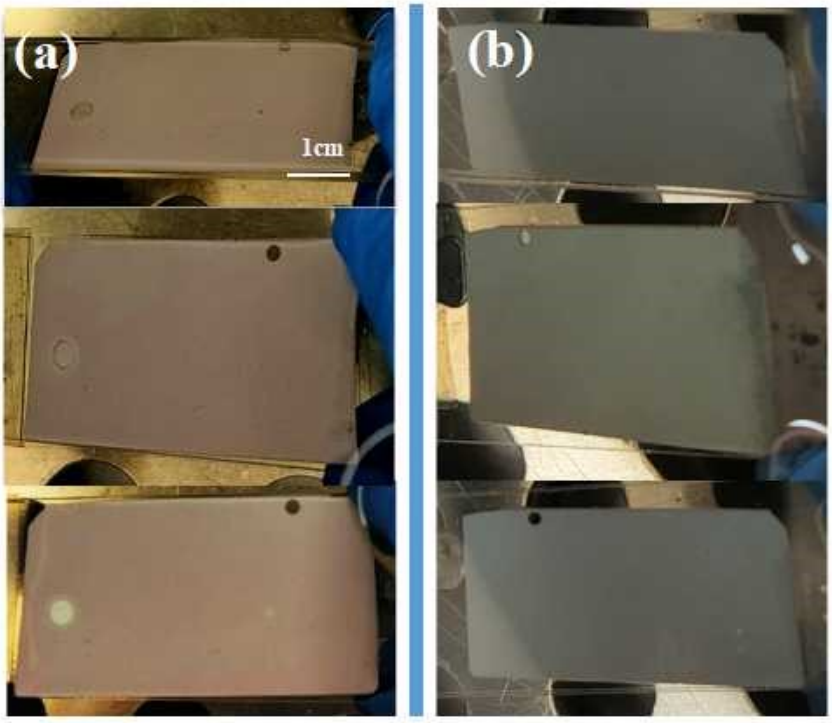

Figure S12. Angle-dependence of composite APS-Ag hydrogel temperature sensor. (a) The sensor shows angle-independence at the temperature of 24 ℃.(b) The sensor shows angle-independence at the temperature of 38 ℃.

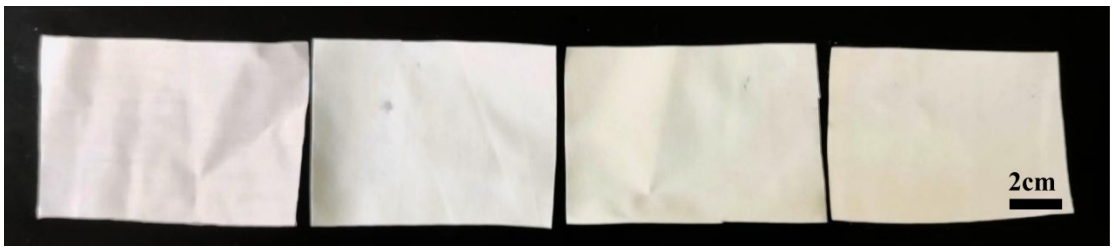

Figure S13. Photos of APS textiles, from left to right, are: original textile, blue APS textile, green APS textile and red APS textile.

Table S1. Reflected wavelength, particle size and PDI of colloidal particles.

Wavelength	Particle size	PDI
622nm	**292.7nm**	**0.045**
580nm	**285.5nm**	**0.048**
570nm	**271.6nm**	**0.018**
559nm	**266.6nm**	**0.030**
539nm	**258.5nm**	**0.047**
469nm	**230.3nm**	**0.026**

References

1. D. C. Corsino and M. D. L. Balela, *IOP Conf. Ser.: Mater. Sci. Eng.*, 2017, **264**, 012020.

2. A. Q. Xie, J. Z. Guo, L. L. Zhu and S. Chen, *Chem. Eng. J.*, 2021, **415**, 128950.