Electronic Supplementary Material (ESI) for Soft Matter.

Supplementary information

Multi-stimuli responsive photonic hydrogel based on a novel photonic crystal template containing gold nanorods

Hanlin Lv§, Jin Li§, Zhengsheng Hu, Yuhang Wang, Yanjun Chen*, Yifeng Wang*

School of Materials Science and Engineering, Wuhan University of Technology, Wuhan 430070, China

***Corresponding Author**

Yanjun Chen - School of Materials Science and Engineering, Wuhan University of Technology, Wuhan 430070, China. E-mail address: yanjunchen@whut.edu.cn

Yifeng Wang - School of Materials Science and Engineering, Wuhan University of Technology, Wuhan 430070, China. E-mail address: yifengwang@whut.edu.cn

Notes

§These authors contributed equally to this work.

Preparation of Au NRs

Gold nanorods (Au NRs) were prepared by the improved seed mediated growth procedure, which was divided into two steps, including the preparation of the seed solution and the synthesis of the growth solution. In the first step, the seed solution was prepared by mixing 5 mL $HAuCl_4$ (0.5 mmol/L) with 5 mL of 0.2 mol/L CTAB solution, then adding 0.6 mL of 0.01 mol/L $NaBH_4$ solution prepared in ice bath to the stirred solution. Vigorous stirring of the mixing solution was continued for 2 min after the solution turned brown. After stopping stirring, the seed solution was kept at room temperature in the dark for 2 h.

To synthesize the growth solution, 2.5 mL of 0.004 mol/L $AgNO_3$ solution was added to 50 mL 0.20 mol/L CTAB solution at 25℃. To this solution, 50 mL $HAuCl_4$ (0.0010 mol/L) was then added, followed by adding 1.5 mL hydrochloric acid (1 mol/L) and 1 ml of 0.0788 mol/L ascorbic acid after gently mixing the solution. Ascorbic acid, as a mild reducing agent, changed the growth solution from dark yellow to colorless. To prepare Au NRs, the addition of 0.12 mL of the seed solution into the growth solution was the final step. Then the resultant solution was stirring vigorously for 30 s and kept at 27℃ for 12 h. To obtain pure Au NRs, the Au NRs dispersion was centrifuged twice with deionized water at the rotation speed of 5000 rpm for 30 min to remove excess CTAB. After the post-treatment, the Au NRs aqueous dispersion with a solid content of 0.5 mg/mL was prepared for later use.

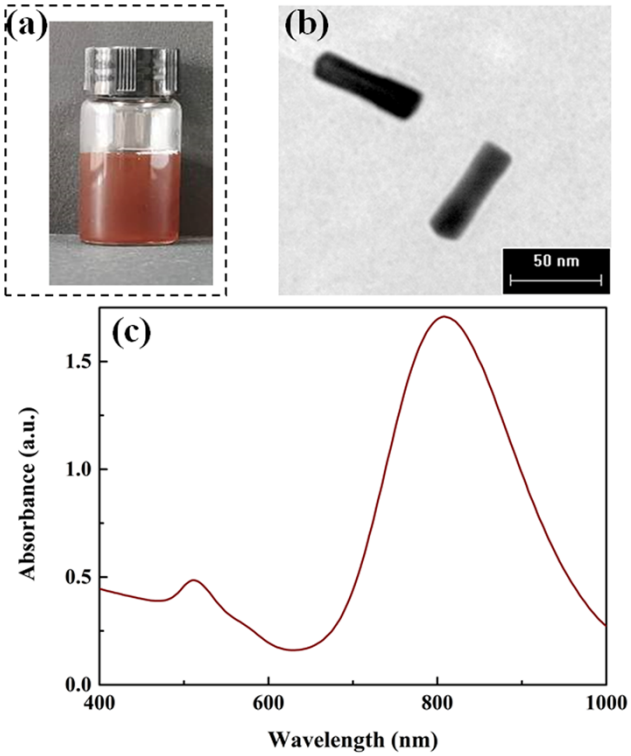

Fig. S1 (a) Optical photo of Au NRs aqueous dispersion; (b) TEM image of Au NRs; (c) Ultraviolet absorption spectrum of Au NRs.

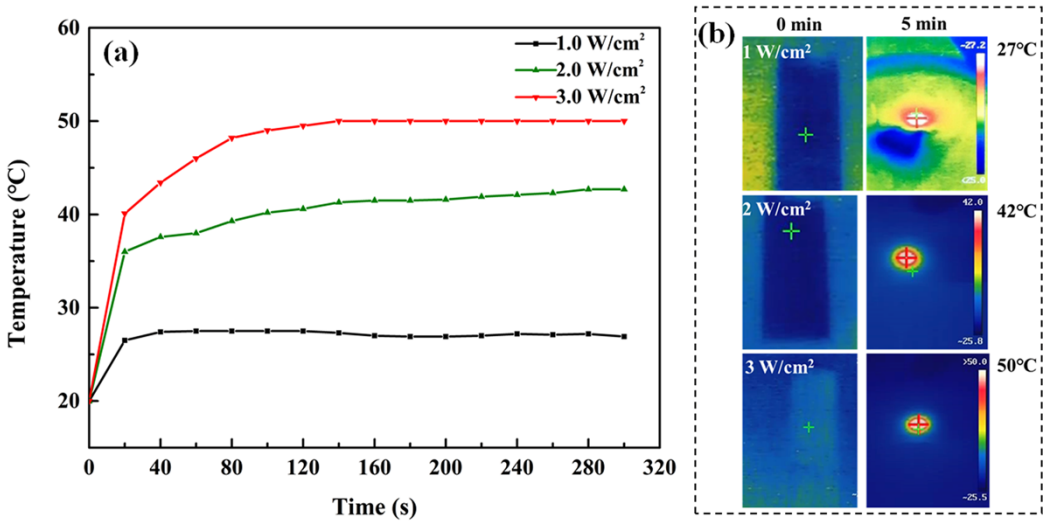

Fig. S2 (a) Temperature rising curve of $MRPH_{258}$-5 film under different NIR intensities; (b) Thermal infrared images of $MRPH_{258}$-5 film under different NIR intensities.

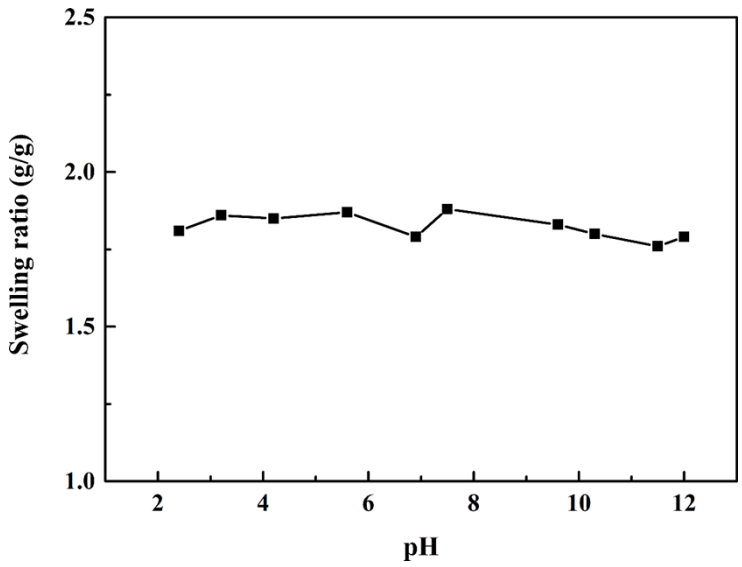

Fig. S3 Swelling ratios of $MRPH_{258}$-5 film in different pH environments.