

Supplementary Information for

Hybrid nano-microstructured and bioinspired conductive hydrogels with tunable multifunctionality

Manting Wang,^{abc} Jiaqi Zhang,^{ab} Yaoyi Guo,^{ab} Xiaoyong Zhou,^c Jie-Xin Wang^{ab} and Yuan Le^{*ab}

^aState Key Laboratory of Organic-Inorganic Composites, Beijing University of Chemical
Technology, Beijing 100029, PR China;

^bResearch Center of the Ministry of Education for High Gravity Engineering and Technology,
Beijing University of Chemical Technology, Beijing 100029, PR China;

^cZhejiang Juhua Co.,Ltd, Zhejiang 323000, PR China.

*Correspondence to leyuan@mail.buct.edu.cn (Y. Le)

S1. Effects of the content of PNIPAM MGs, Ag NWs and PDA chains on the mechanical properties of AgPMP hydrogels

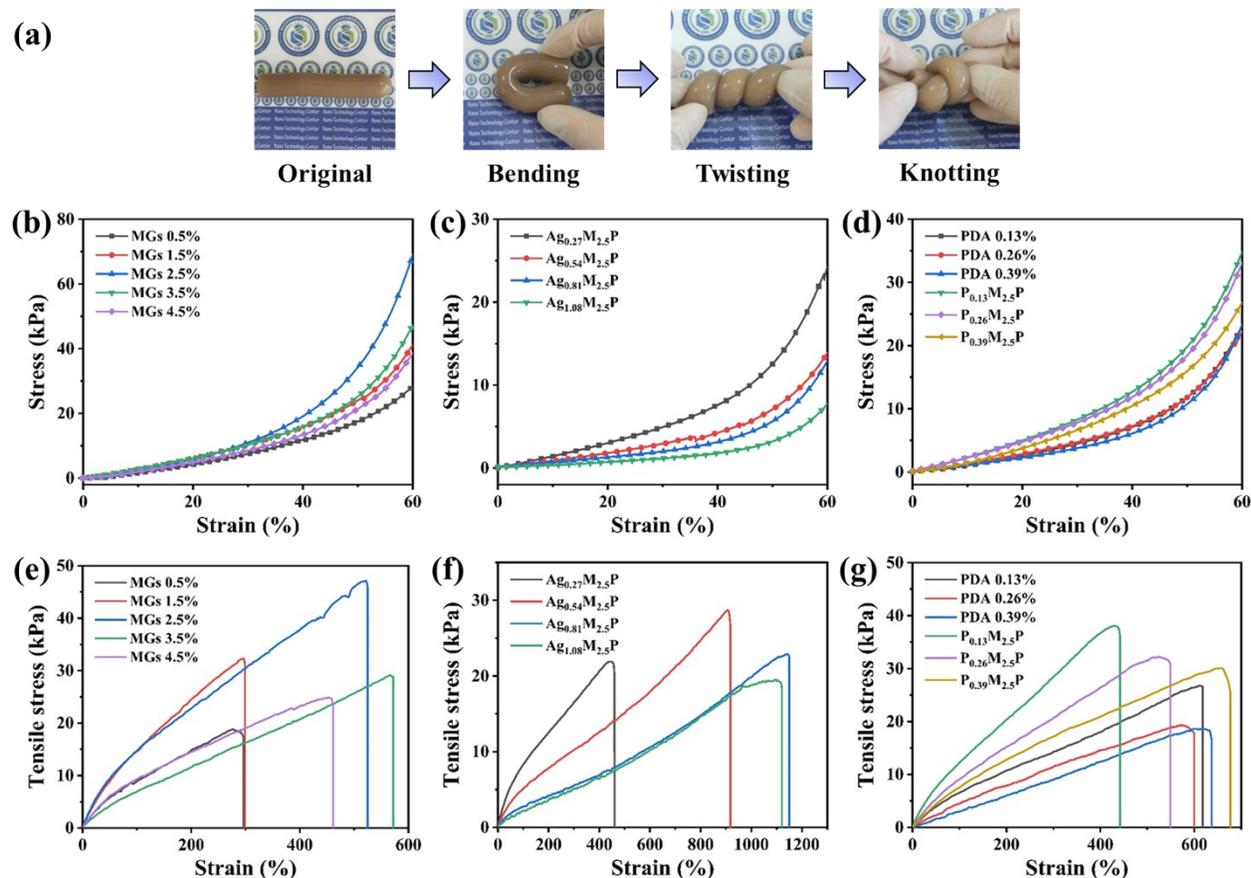


Figure S1. (a) The original, bending, twisting and knotting shapes of $\text{Ag}_{0.27}\text{P}_{0.13}\text{M}_{2.5}\text{P}$ hydrogel. The compression stress-strain curves of (b) MP hydrogels with different MGs/NIPAM ratios, (c) AgMP hydrogels with different Ag/NIPAM ratios, as well as (d) PP hydrogels and PMP hydrogels with different PDA/NIPAM ratios. The tensile stress-strain curves of (e) MP hydrogels with different MGs/NIPAM ratios, (f) AgMP hydrogels with different Ag/NIPAM ratios, as well as (g) PP hydrogels and PMP hydrogels with different PDA/NIPAM ratios.

S2. Effect of PDA content on the photothermal conversion performance of AgPMP hydrogel

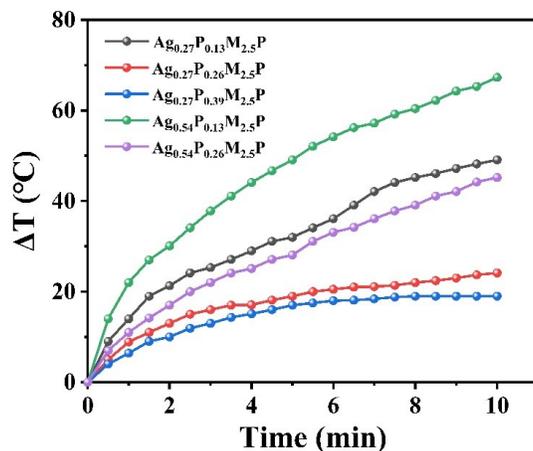


Figure S2. Temperature changes of AgPMP hydrogels with different PDA/NIPAM ratios.

S3. Effects of usage amount and Ag NWs content of AgPMP hydrogel on antibacterial activity

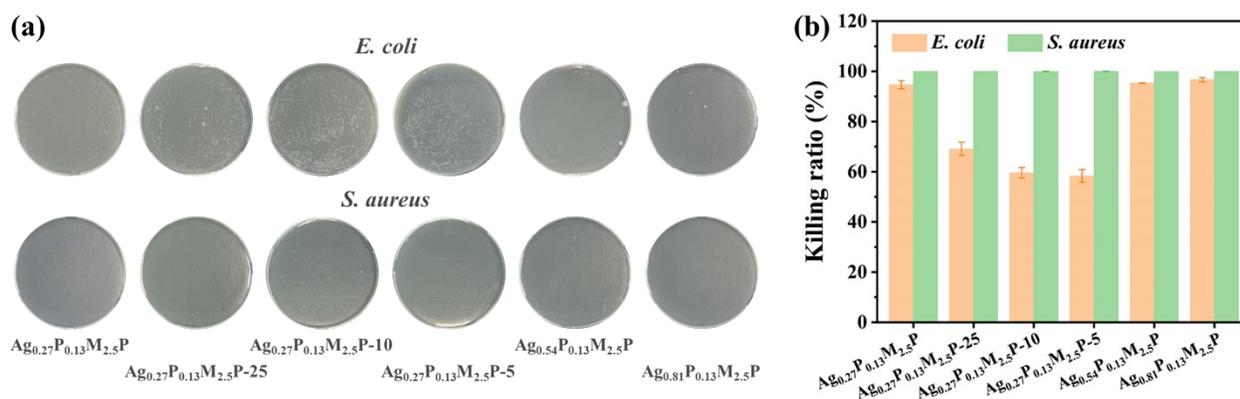


Figure S3. (a) Images of bacterial colonies formed by *E. coli* and *S. aureus* after treating with 50, 25, 10, 5 mg Ag_{0.27}P_{0.13}M_{2.5}P, and Ag_{0.54}P_{0.13}M_{2.5}P as well as Ag_{0.81}P_{0.13}M_{2.5}P hydrogels. (b) The corresponding bacterial-killing efficiency against *E. coli* and *S. aureus*.

S4. The photothermal antibacterial activity of AgPMP hydrogels

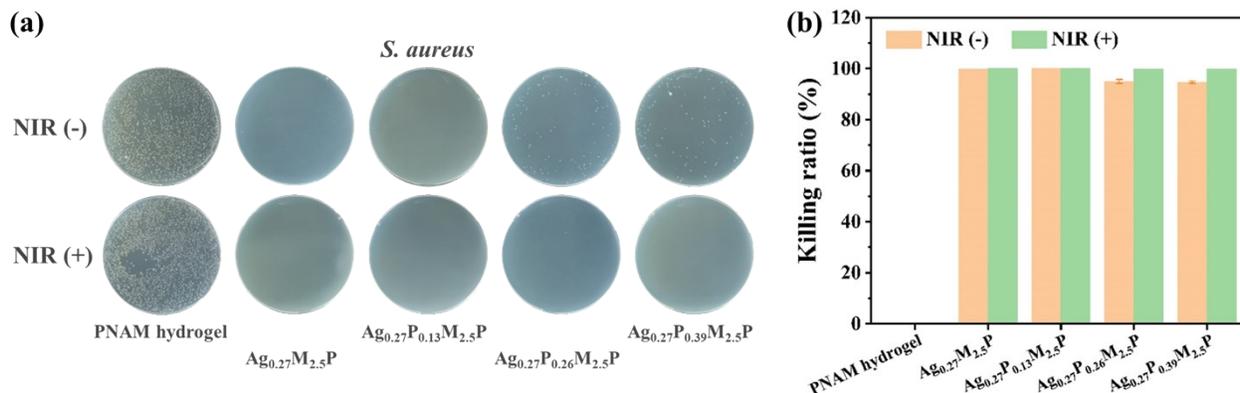


Figure S4. (a) Images of bacterial colonies formed by *S. aureus* after treating with 10 mg PNAM hydrogel, Ag_{0.27}M_{2.5}P hydrogel and AgPMP hydrogels with different PDA/NIPAM ratios under NIR irradiation and NIR non-irradiation, respectively. (b) The corresponding bacteria-killing efficiency against *S. aureus*.

S5. The photothermal antibacterial activity of AgPMP hydrogels

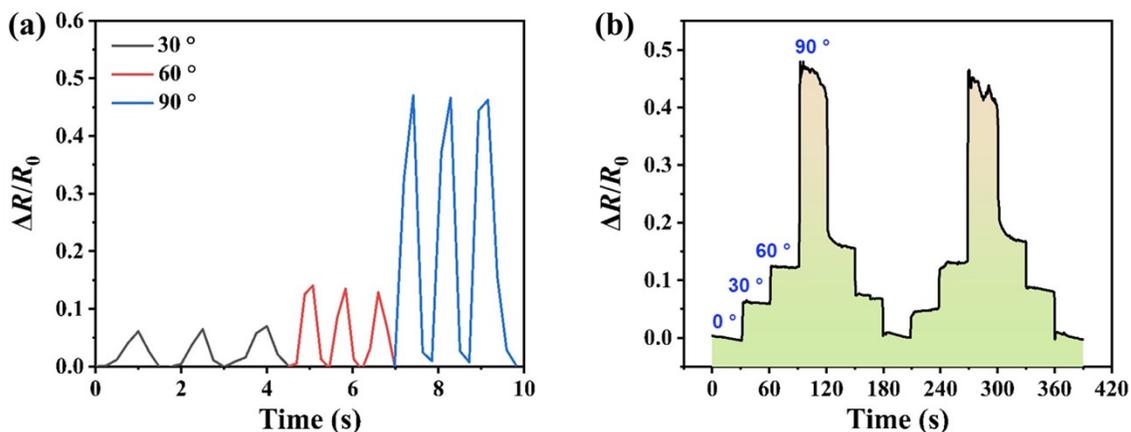


Figure S5. (a) The real-time detection of human motions when Ag_{0.54}M_{2.5}P hydrogel adhered to finger. (b) Relative resistance changes of Ag_{0.54}M_{2.5}P hydrogel adhered to finger to a stepwise bending cycle.