Supplementary material

$Ti_3C_2T_x$-AuNP based paper substrates for label-free SERS detection of bacteria and multimodal antibacterials

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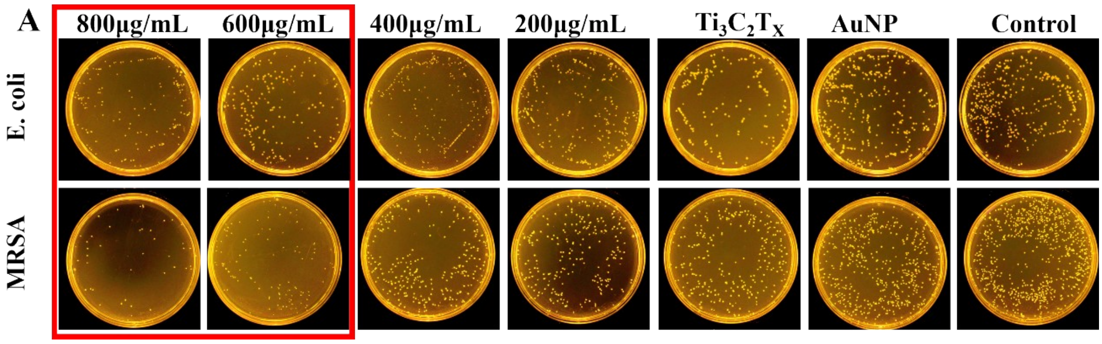

Figure. S1 Antibacterial activities in aqueous suspensions without laser after 5 h: bacterial suspensions with cellulose paper soaked in NaCl solution (0.9%) were used as control. Photographs of agar plates onto which E. coli and MRSA bacterial cells were recultivated after treatment with cellulose paper soaked in 200 μg/mL to 800 μg/mL $Ti_3C_2T_x$-AuNP nanocomposite, $Ti_3C_2T_x$ and AuNP, respectively.

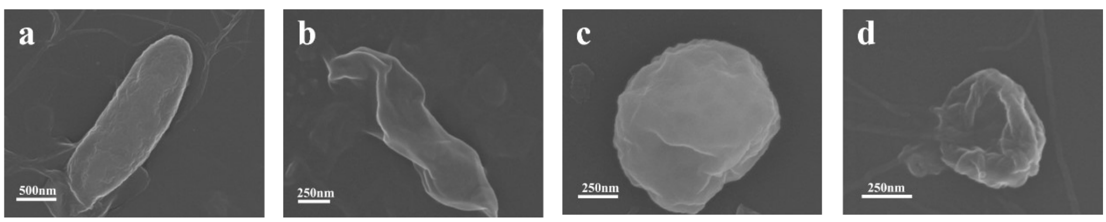

Figure. S2 SEM images of the E. coli (b) and MRSA (d) treated with cellulose paper soaked in 600 μg/mL of $Ti_3C_2T_x$-AuNP. Control bacterial cells (a, c).

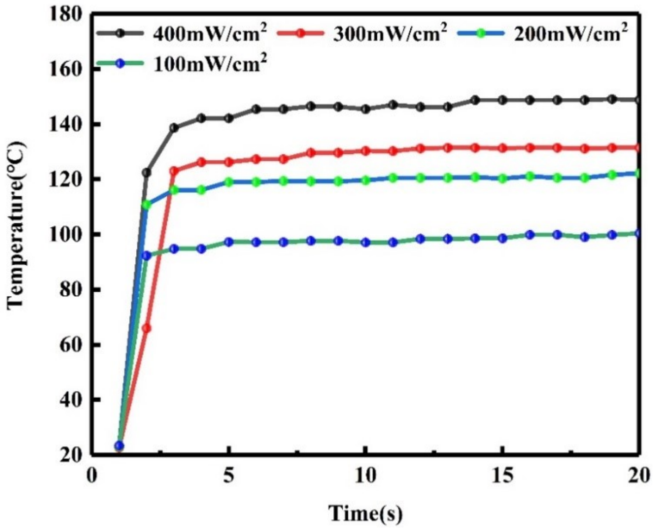

Figure. S3 Temperature changes of dry cellulose paper soaked in 600 μg/mL $Ti_3C_2T_x$ -AuNP nanocomposite with a series of power densities of 808 nm laser irradiation.

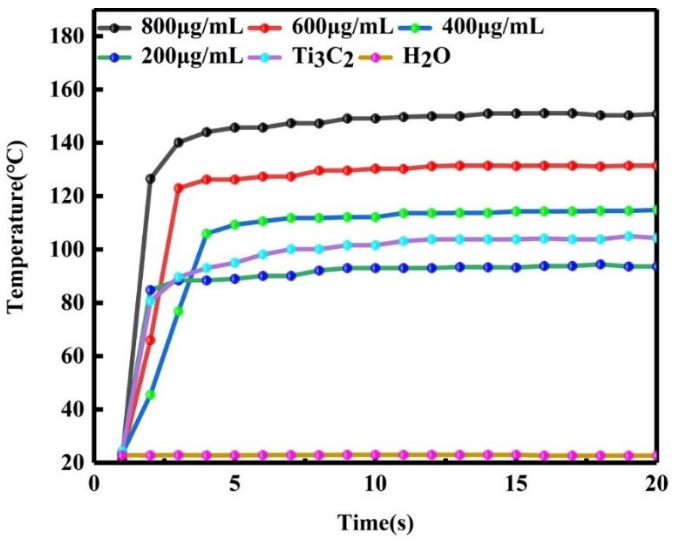

Figure. S4 Temperature changes after NIR irradiation (808 nm, 300 mW/cm^2) for 20s with various materials and different concentrations of $Ti_3C_2T_x$ -AuNP.

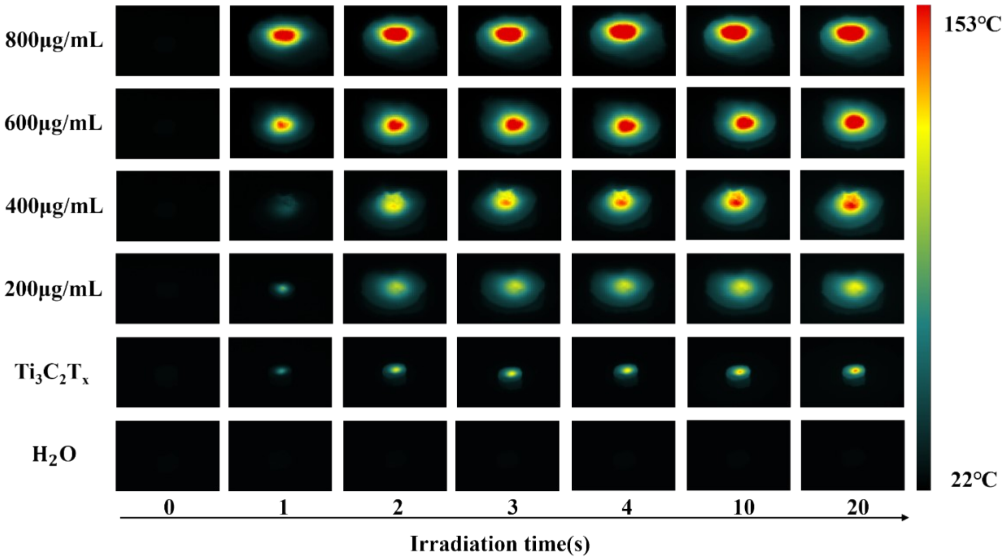

Figure. S5 Thermal imaging after NIR irradiation (808 nm, 300 mW/cm^2) for 20s with various materials and different concentrations of $Ti_3C_2T_x$-AuNP.

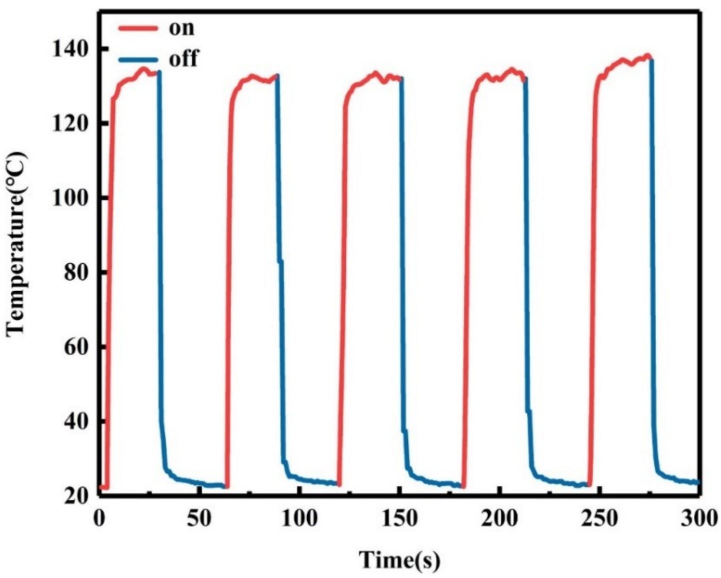

Figure. S6 Photothermal heating curves of dry cellulose paper soaked in 600 μg/mL $Ti_3C_2T_x$-AuNP nanocomposite for five cycles under laser on/off cycles with NIR laser (808 nm, 300 mW/cm^2) irradiation.

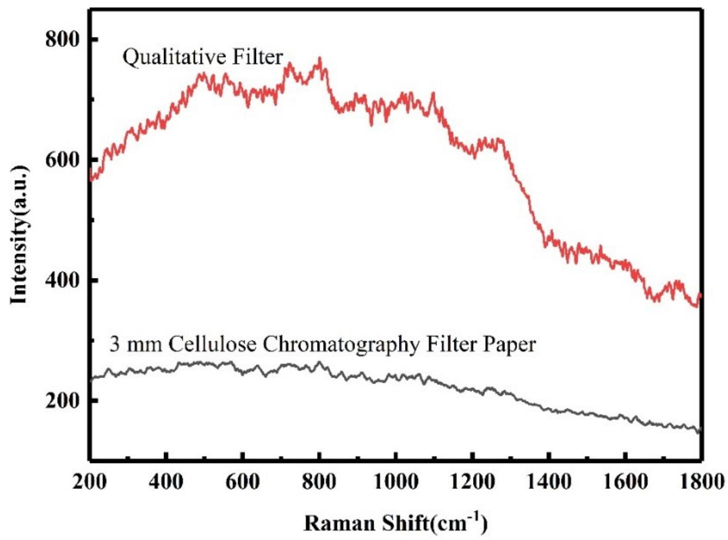

Figure. S7 Raman spectra of qualitative filter paper and 3mm cellulose chromatography filter paper.

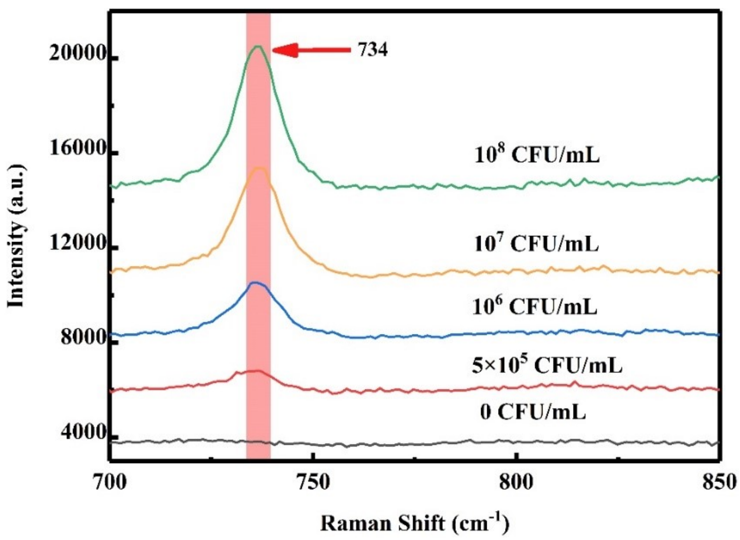

Figure. S8 SERS detection of MRSA in porcine skin

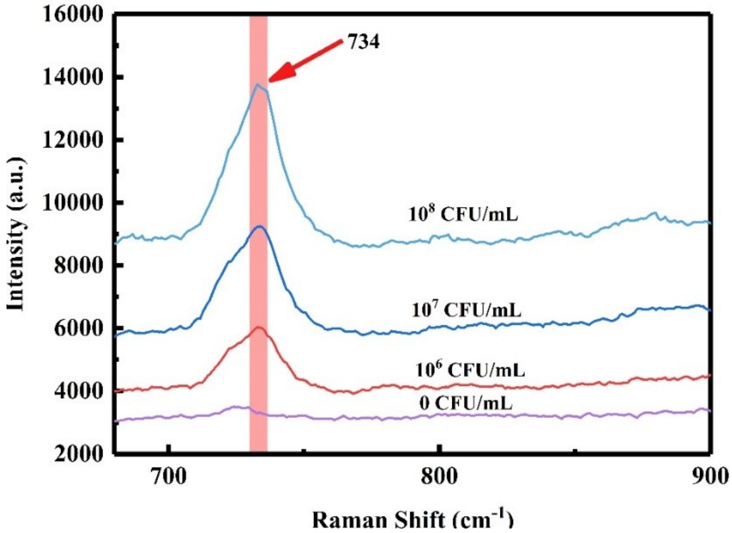

Figure. S9 SERS detection of MRSA in porcine serum.

Table S1 Direct SERS detection of bacteria

Materials	substrate	Limit of Detection	Ref.
Ag@TiO_2 electrospinning nanofibrous	TiO_2 nanofibers	E. coli is 10^8 CFU/mL	1
Au-TPP	TPP	E. coli is 10^8 CFU/mL; S. aureus is 10^8 CFU/mL	2
Paper substrate of $Ti_3C_2T_x$-AuNP	Paper	E. coli is 10^5 CFU/mL； MRSA is 5×10^5 CFU/mL	*This work*

Table S2 Antibacterial activity of materials

Materials	Laser	Power	Time	Bacterial Survival Rate	Ref.
PDEGMA	/	/	24 h	S. aureus is about 10%	3
CS hydrogel	/	/	24 h	E. coli is 26.35% MRSA is 35.49%	*4*
$AuNst_{120}$	/	/	8 h	S. aureus is 40%	5
CuS@GDY	808 nm	400 mW/cm^2	10 min	E. coli is about 0.01% S. aureus is about 0.01%	6
PDA-PAM/Mg^{2+} gel	808 nm	2 W/cm^2	10 min	E. coli is about 7.06% S. aureus is about 5.29%	7
Paper substrate of $Ti_3C_2T_x$-AuNP	808 nm	300 mW/cm^2	5 min	E. coli is about 0.06% MRSA is 7.19%	*This work*

References

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