Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supporting Information

Gellan hydrogel-template synthesis of Au/MnO_2 with enhanced photothermal conversion performance for localized cancer therapy

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1. Calculation of photothermal conversion efficiency

The photothermal conversion efficiency of three samples was be calculated by using the following formula according to the methods of these articles.[1]

$$\eta = \frac{hS(T_{max} - T_{max,\ water})}{I(1 - 10^{-A_{808}})}$$

$$hS = \sum mC_p/\tau_s$$

$$\tau_s = (-t)/ln\theta$$

$$\theta = （T_{amb} - T）/（T_{amb} - T_{max}）$$

h is the heat transfer coefficient;

S is the surface area of the photothermal test vessel;

τ_s is the time constant of samples;

m is the mass of samples (~ 1.0 g);

C_p is the specific heat capacity of water (C_p = 4.2 J·mol^{-1});

A_{808} is the absorbance at 808 nm of different samples.

According to the first heating-cooling process in the photothermal cycle, τ_s is obtained by the linear relationship between the cooling period and natural logarithm of driving force temperature (Figure S3).

2. Supplementary Figures

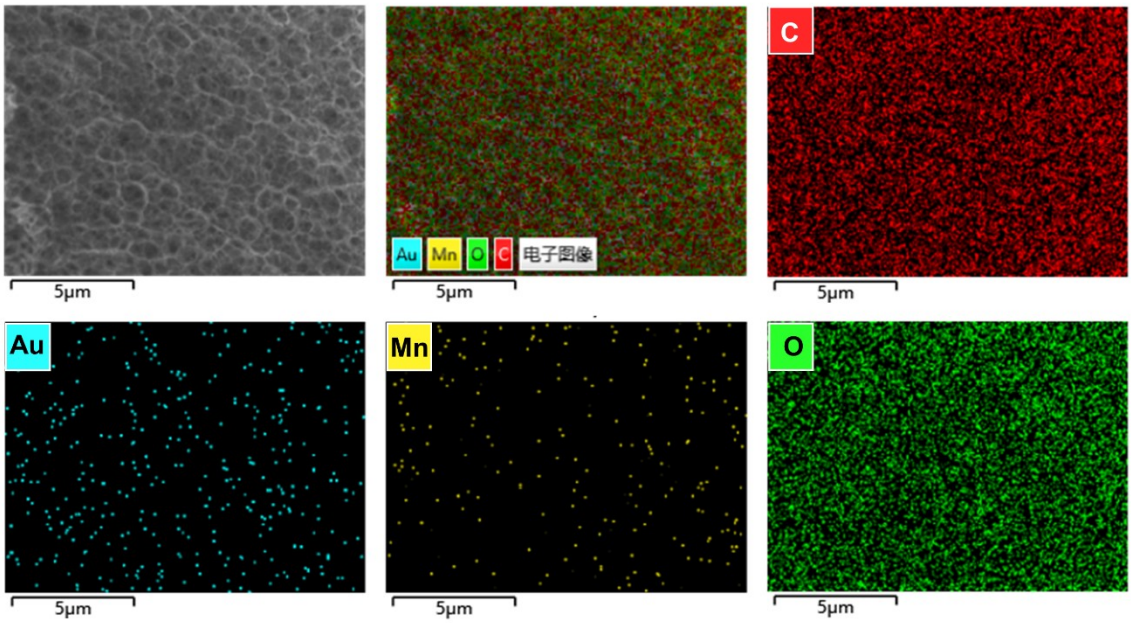

Figure S1. SEM and elemental mapping of Au/MnO_2@GG nanocomposite hydrogel.

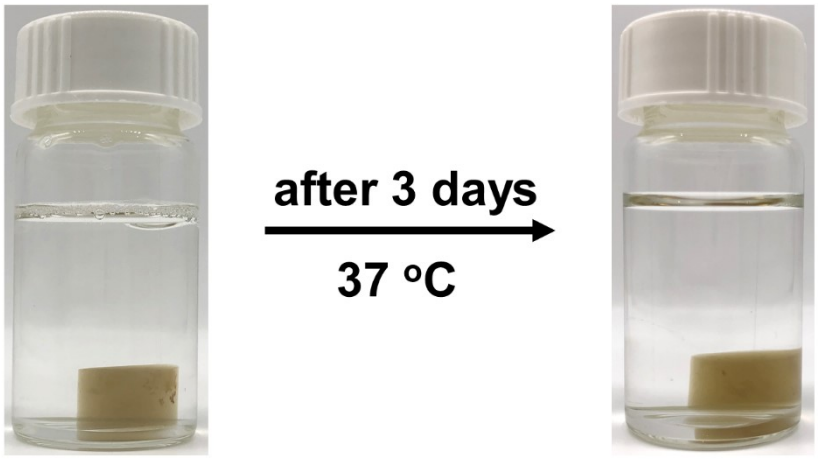

Figure S2. Digital photographs of Au/MnO_2@GG nanocomposite hydrogel soaking in the PBS medium at 37 °C.

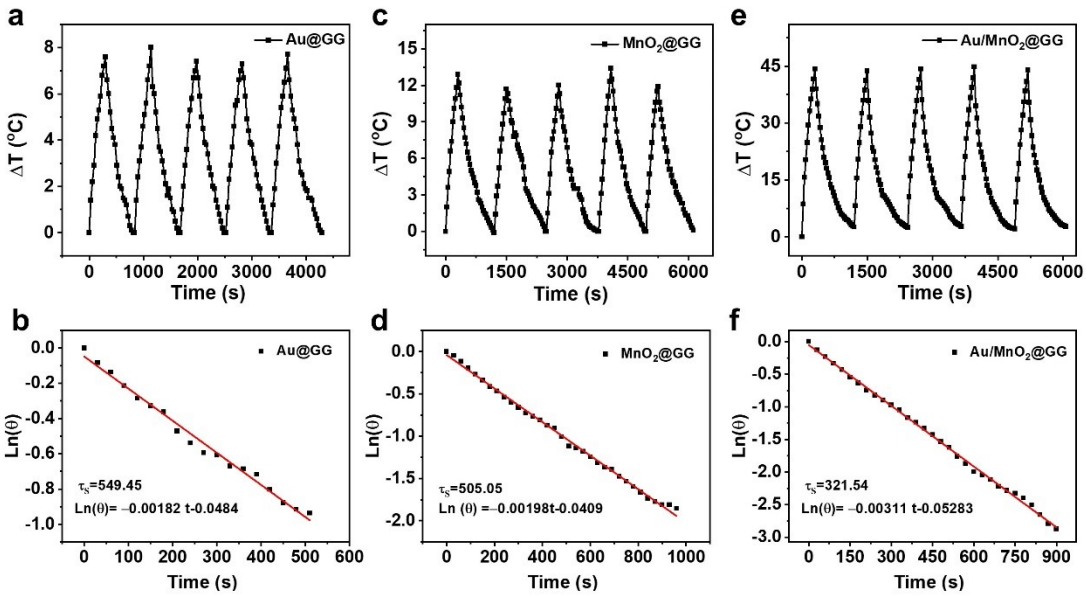

Figure S3. Calculation of photothermal conversion efficiency using the first photothermal cycle of (a, b) Au@GG, (c, d) MnO_2@GG and (e, f) Au/MnO_2@GG.

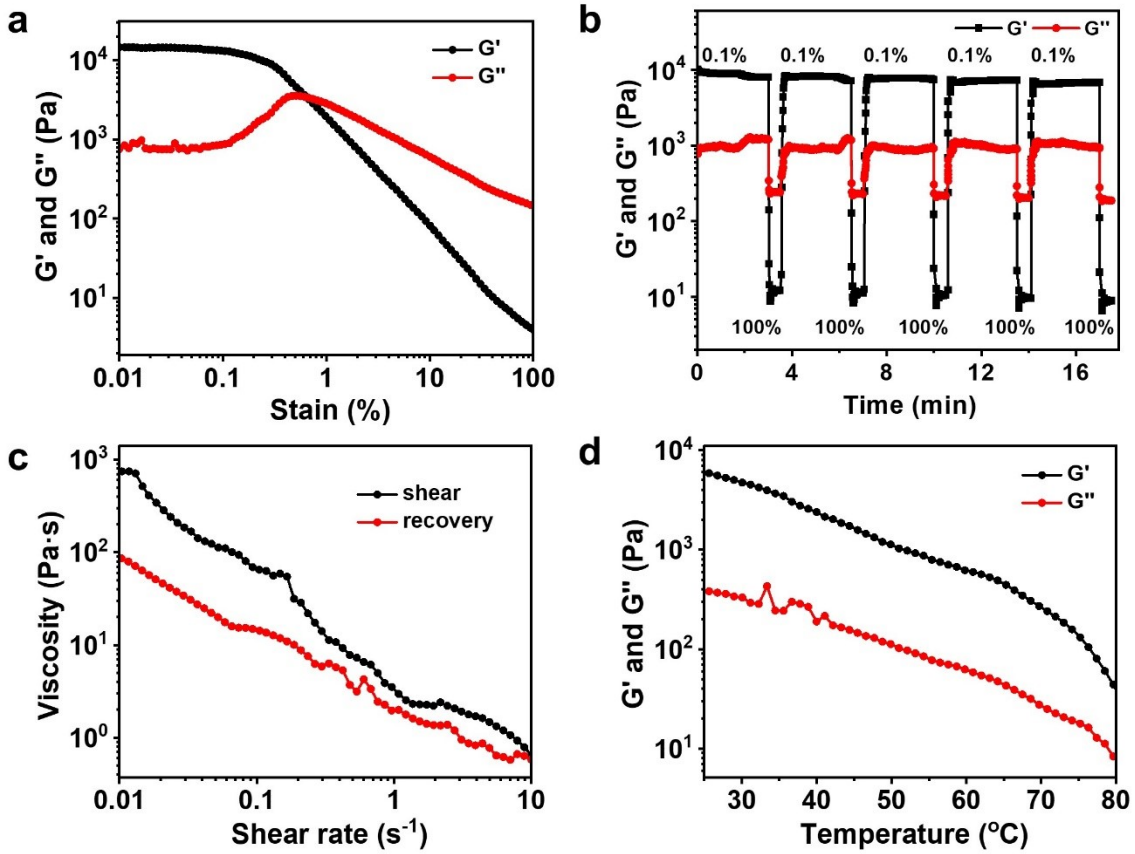

Figure S4. Rheological measurement of the pure gellan hydrogel. (a) Strain-dependent moduli. (b) Self-recovery of moduli by alternate strain sweeps at 37 °C. (c) Shear rate-dependent viscosity. (d) Temperature-dependent moduli.

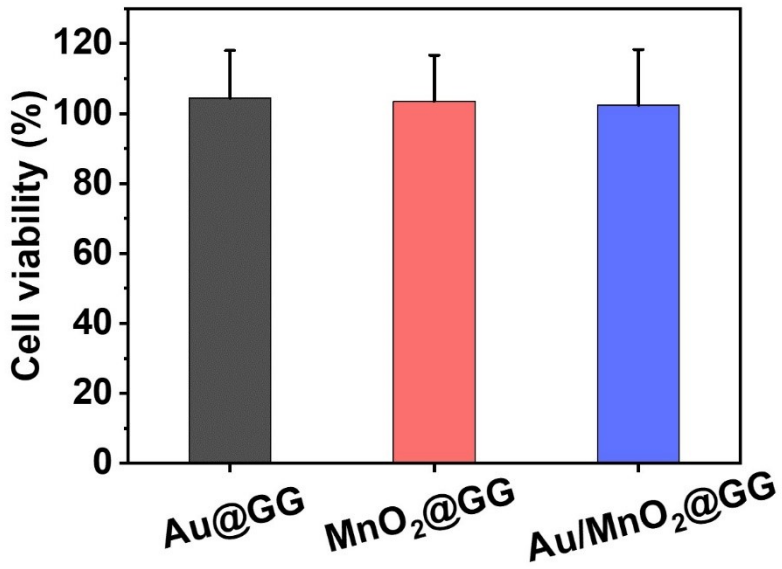

Figure S5. Cell viability (4T1 cells was chosen as the cell model) of different samples.

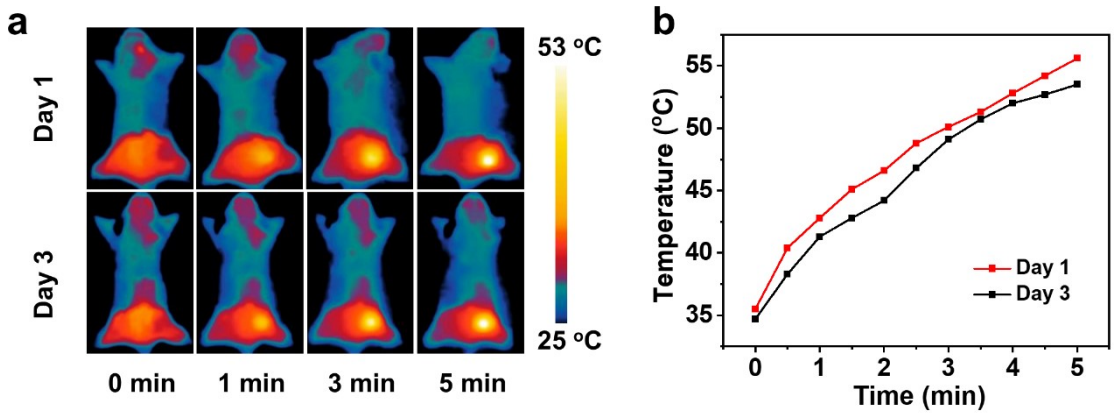

Figure S6. (a) IR thermal images of mice after injection with Au/MnO_2@GG nanocomposite hydrogels and irradiation with an 808 nm laser (1.0 W cm^{-2}) on the first and third days; (b)The temperature curve of the tumor site during the irradiation.

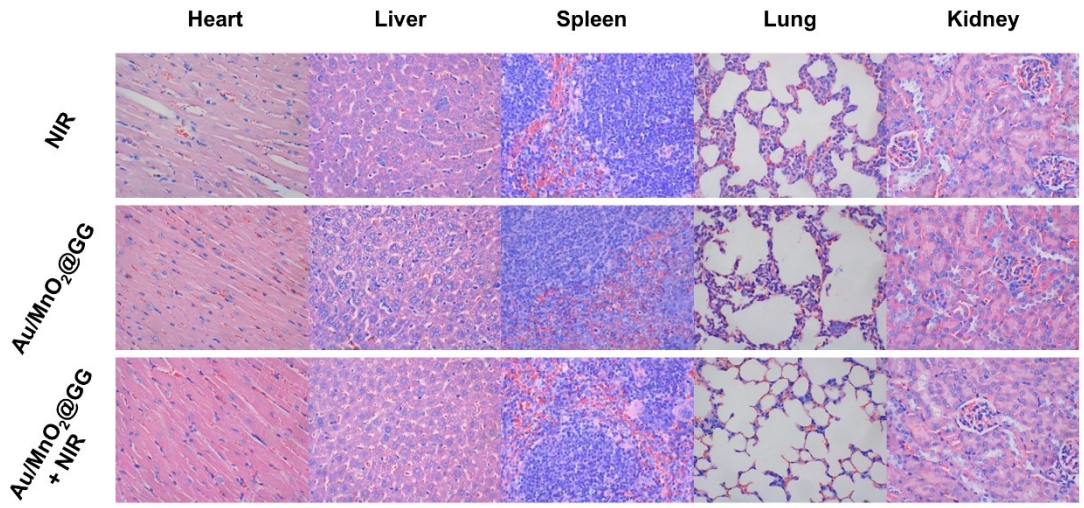

Figure S7. Histological data (H&E-stained images) of major organs (heart, liver, spleen, lung, and kidney) from different groups after the whole treatment (lasting for 15 days).

Reference

1. C. Sun, L. Wen, J. Zeng, Y. Wang, Q. Sun, L. Deng, C. Zhao and Z. Li, *Biomaterials*, 2016, **91**, 81-89.