

## Supplementary information

### Gold nanocluster decorated fibrous substrate for photo-modulated cellular growth

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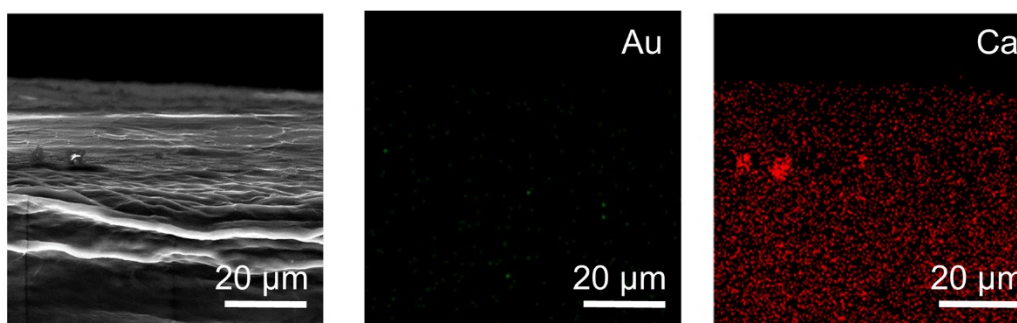


Fig. S1 Au and Ca elemental mapping images of fibrous-GG.

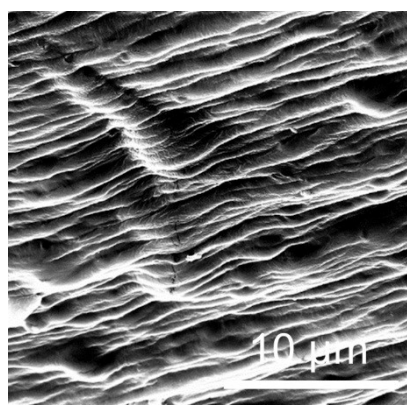
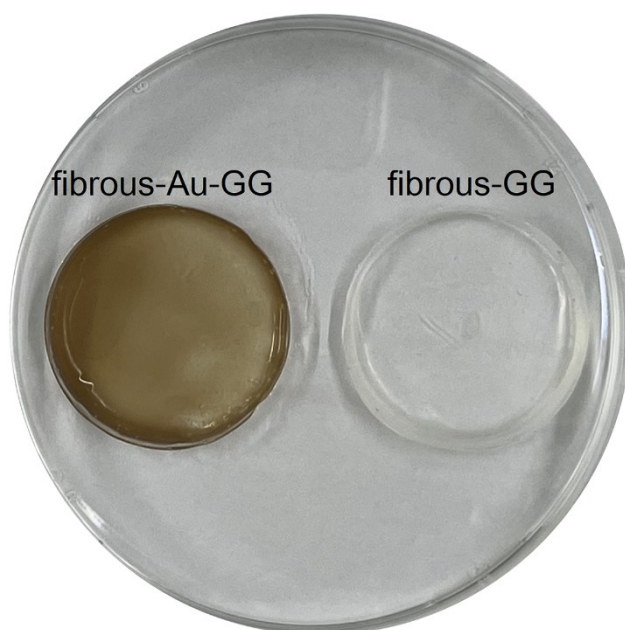
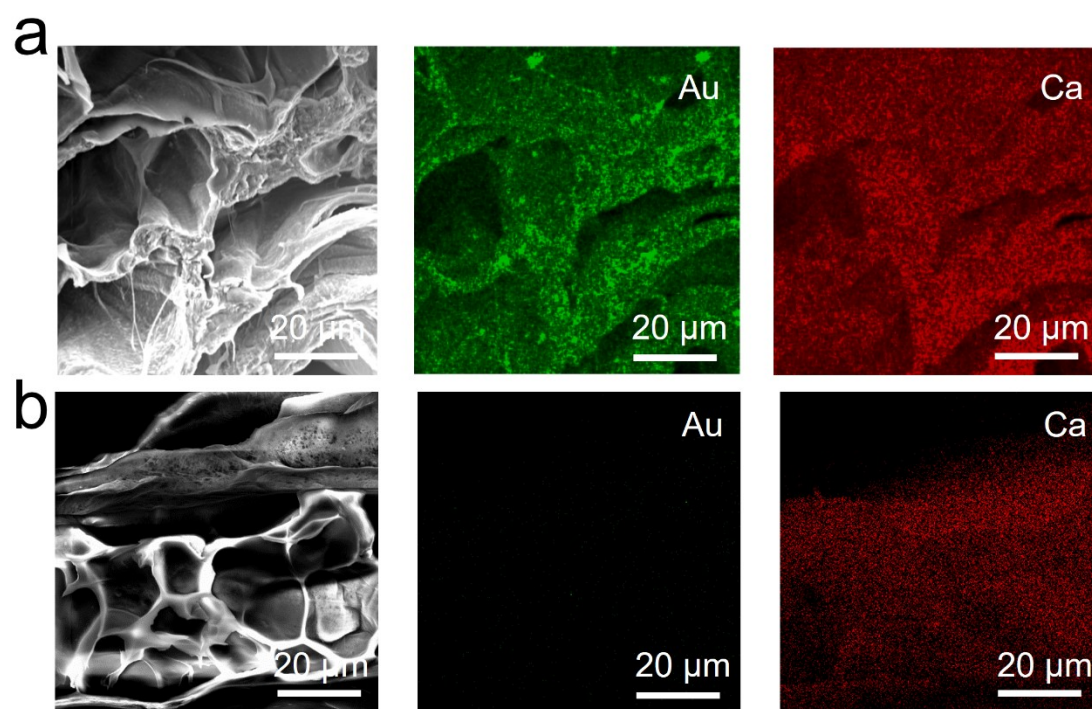


Fig. S2 Surface SEM image of fibrous-GG.



**Fig. S3** Photographs of fibrous-Au-GG and fibrous-GG.



**Fig. S4** Au and Ca elemental mapping images of (a) Au-GG hydrogel and (b) GG hydrogel.

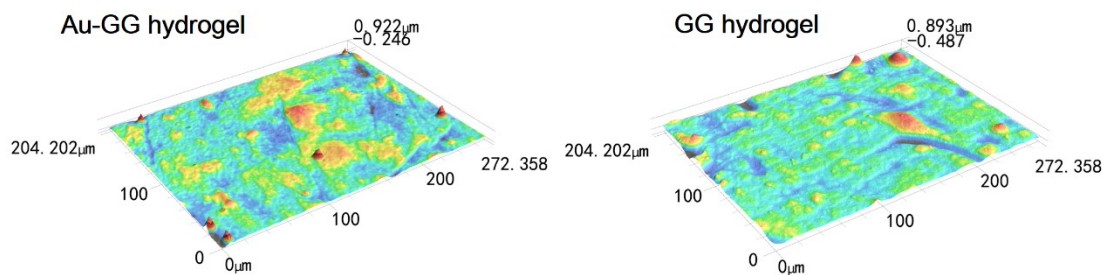


Fig. S5 Images of surface morphology of Au-GG hydrogel and GG hydrogel.

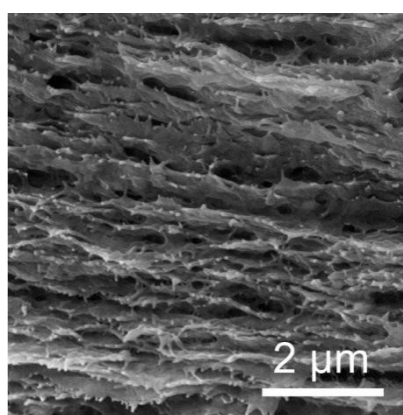


Fig. S6 SEM image of fibrous-Au-GG after irradiation.

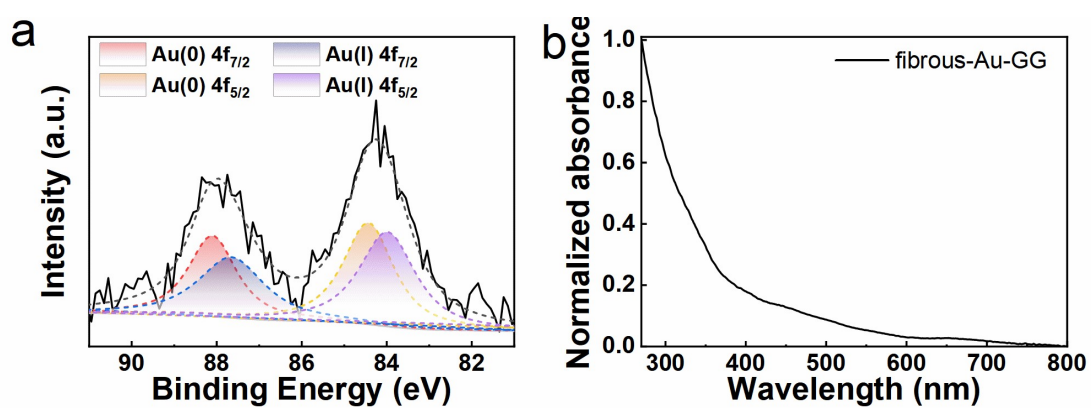


Fig. S7 (a) The XPS spectra of the Au 4f orbital in fibrous-Au-GG after irradiation. (b) Normalized absorption spectra of fibrous-Au-GG after irradiation.

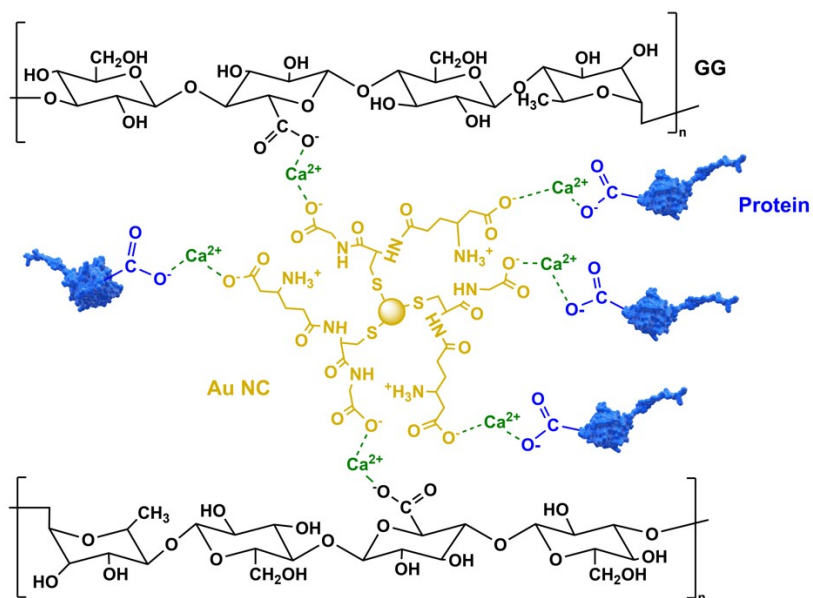


Fig. S8 Structural formula of the ionic cross-link among the Au NCs, GG and the protein.

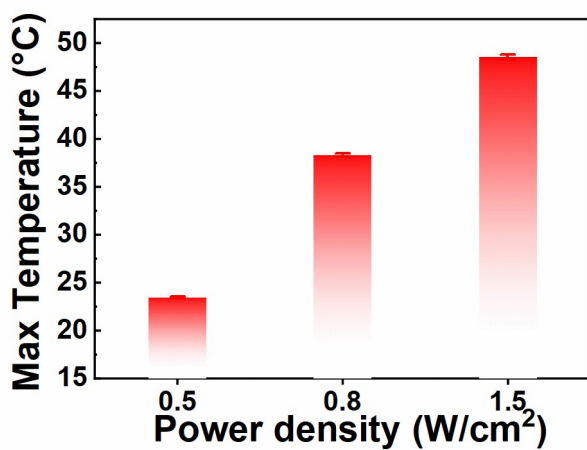
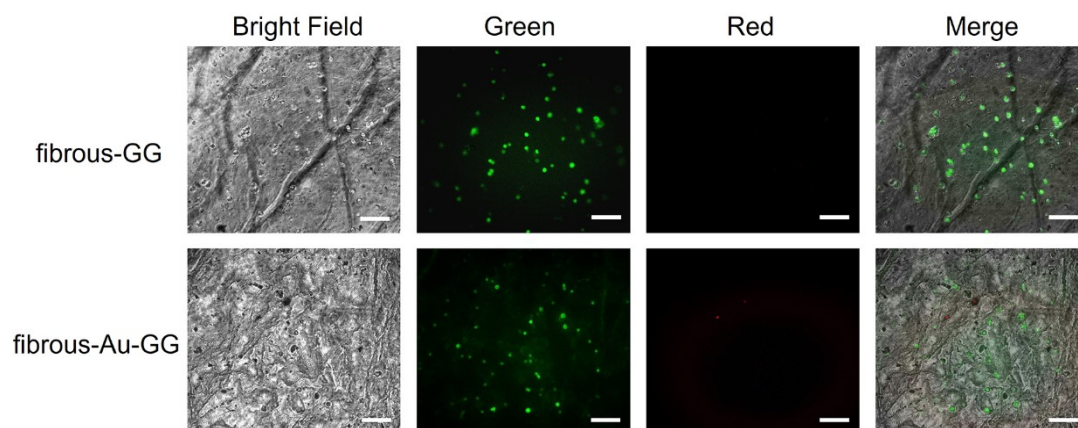
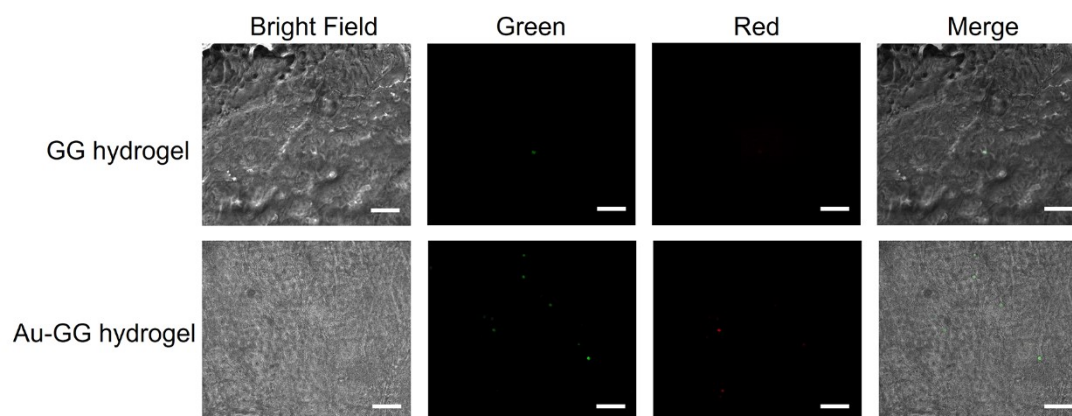


Fig. S9 Max temperature of fibrous-Au/Protein-GG upon different power density of irradiation.



**Fig. S10** Viability of MG-63 cells adhered on fibrous-GG and fibrous-Au-GG hydrogels. The calcein emitted green fluorescence and PI emitted red fluorescence. (Scale bar, 100  $\mu\text{m}$ )



**Fig. S11** Viability of MG-63 cells adhered on GG hydrogel and Au-GG hydrogel. The calcein emitted green fluorescence and PI emitted red fluorescence. (Scale bar, 100  $\mu\text{m}$ )

**Table S1.** Calculated the Au(0): Au(I) ratios of fibrous-Au-GG and Au NC.

fibrous-Au-GG	Au(I) $4f_{7/2}$	Au(I) $4f_{5/2}$	Au(0) $4f_{5/2}$	Au(0) $4f_{7/2}$
Peak (eV)	88.10	84.43	87.65	84.00
Area	1231.357	1641.809	1271.761	1695.681
Au(0): Au(I) ratio	50.8:49.2			
Au NC	Au(I) $4f_{5/2}$	Au(I) $4f_{7/2}$	Au(0) $4f_{5/2}$	Au(0) $4f_{7/2}$
Peak (eV)	88.10	84.43	87.65	84.00
Area	5042.83	6723.772	5225.747	6967.663
Au(0): Au(I) ratio	50.9:49.1			