

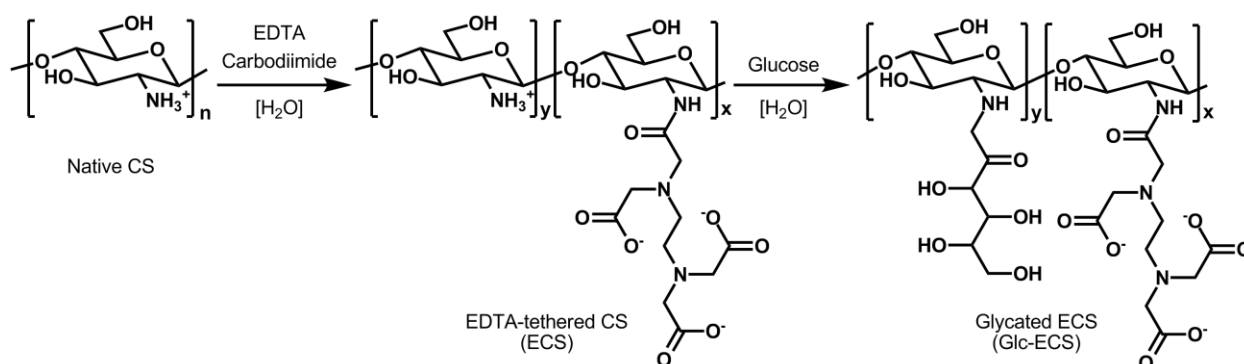
Supplementary Information

Chitosan-Based Glycated Polyampholyte Nanogels for Copper-Catalysed Fenton-Like Reaction

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Scheme S1 Synthetic scheme of Glc-ECS by chemical modification of native CS ($n = \sim 430$, $x = 0.2-0.5$).

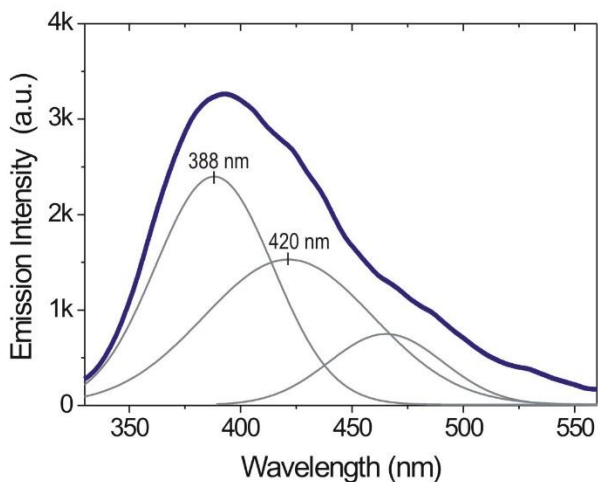


Fig. S1 Fluorescence emission spectrum of Glc-ECS ($\lambda_{ex} = 340$ nm) (blue) and the corresponding spectra obtained by deconvolution (black).

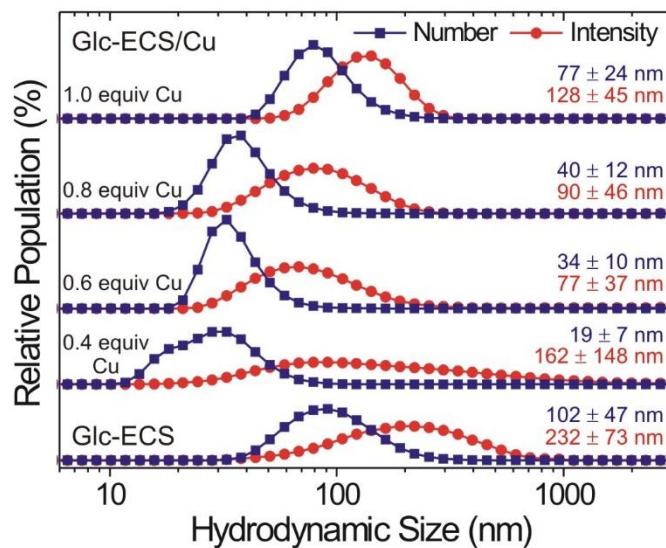


Fig. S2 DLS distribution of Glc-ECS/Cu nanogels depending on the loading amount of Cu(II) ion. Before addition of Cu(II), soluble Glc-ECS can have a random coil conformation, showing relatively large sizes with a broader size distribution, while Cu-chelation can transform the polymer into a condensed globular structure, leading to a significant reduction in diameter.^{S1}

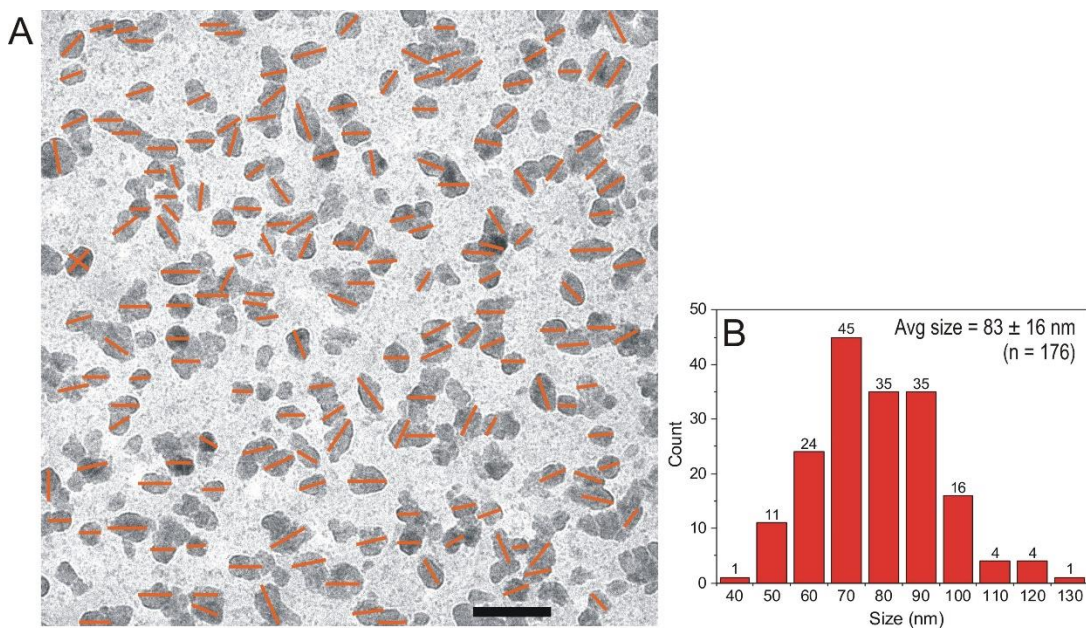


Fig. S3 Statistical particle size estimate of Glc-ECS/Cu nanogels. (A) Large area TEM image (scale bar = 200 nm) and (B) the corresponding size distribution of Glc-ECS/Cu nanogels.

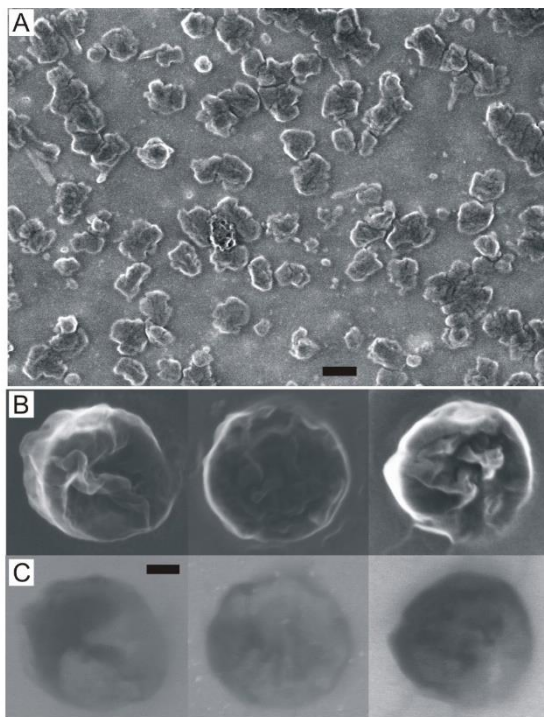


Fig. S4 (A) Large area scanning electron microscope (SEM) image of Glc-ECS/Cu nanogels (Scale bar: 100 nm). (B, C) High resolution SEM images of individual Glc-ECS/Cu nanogel particle in (B) SEM mode and (C) the corresponding bright-field STEM mode, which provide the information on the internal structures (Scale bar: 20 nm). In STEM mode, dense regions with heavy elements appear brighter, while a darker contrast shows less dense regions with light elements.

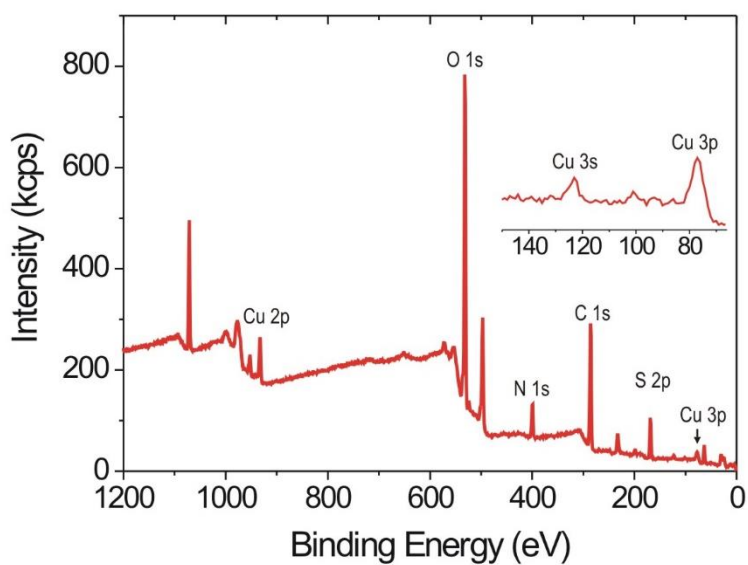


Fig. S5 XPS survey spectrum of Glc-ECS/Cu nanogels.^{S2}

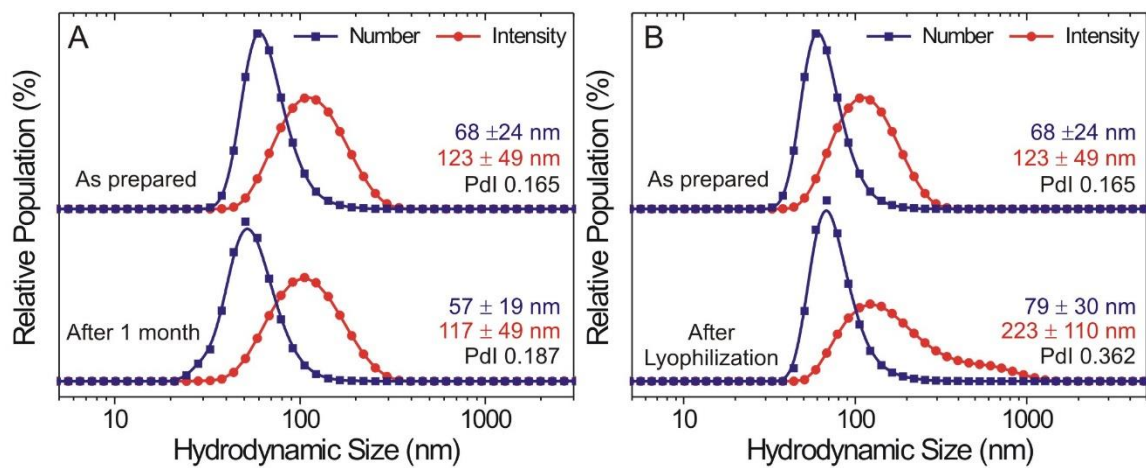


Fig. S6 Colloidal stability observation of Glc-ECS/Cu nanogels by comparing the DLS distribution (A) after 1-month agitation at room temperature and (B) after lyophilization and rehydration.

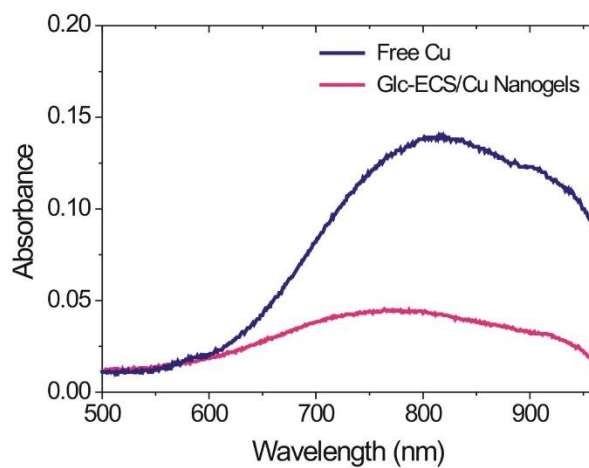


Fig. S7 Estimation of Cu leakage after Glc-ECS/Cu nanogel formation through centrifugal filtration. Compared to the free Cu, less than 30% Cu leakage was observed from the nanogels.

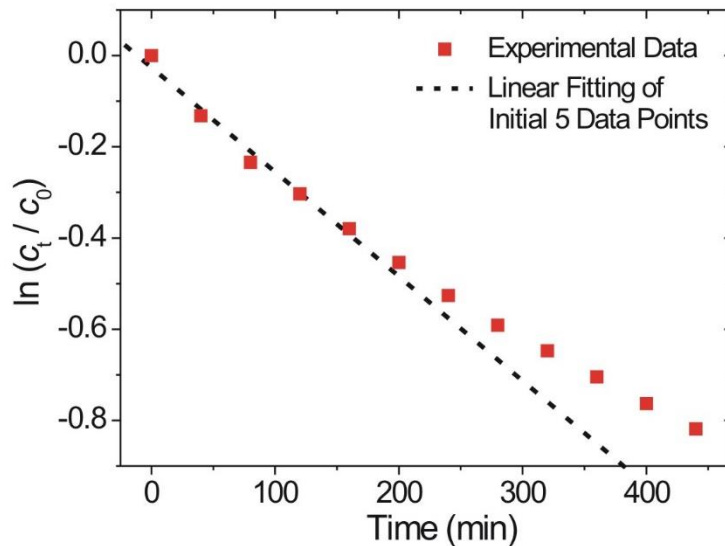


Fig. S8 First-order fit of reaction kinetics monitored with Glc-ECS/Cu under the condition of $[\text{Cu}^{2+}] = 0.6$ mM, $[\text{MB}] = 40$ μM , and $[\text{H}_2\text{O}_2] = 80$ mM at 25 $^\circ\text{C}$, showing significant deviation from linearity.

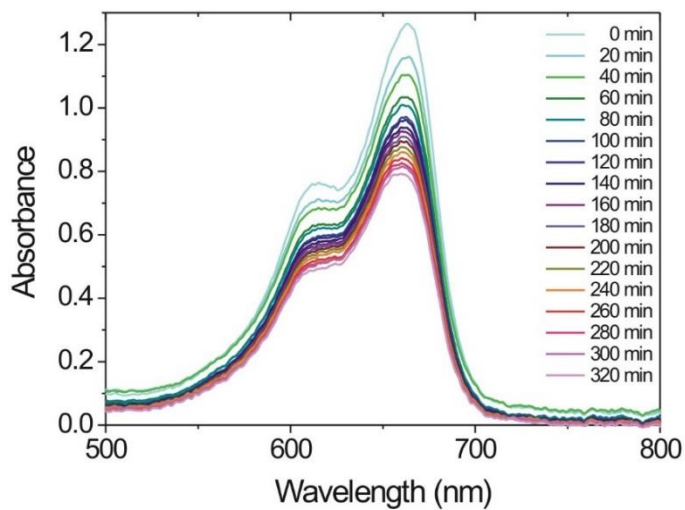


Fig. S9 Time-dependent change of UV-vis absorption spectra of MB by Glc-ECS/Cu-catalysed reaction under the condition of $[\text{Cu}^{2+}] = 0.6$ mM, $[\text{MB}] = 40$ μM , and $[\text{H}_2\text{O}_2] = 10$ mM at pH 7.0 and 25 $^\circ\text{C}$.^{S3}

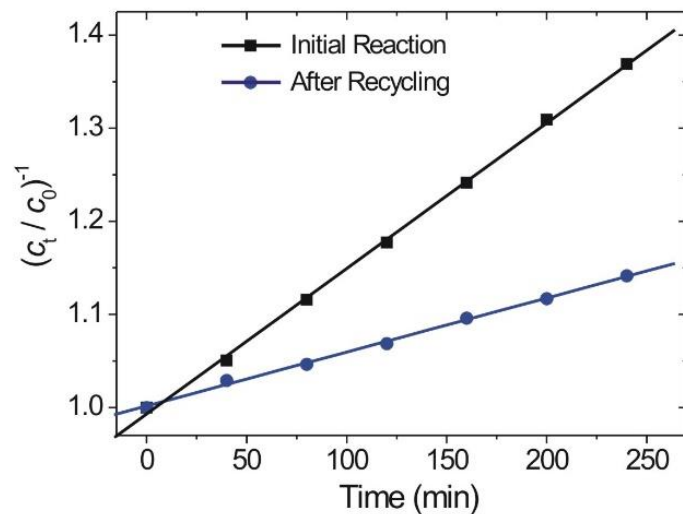


Fig. S10 Comparison of Fenton-like reaction kinetics after the recycling of Glc-ECS/Cu catalyst through centrifugal filtration.

References.

- S1. Y. H. Jeong, T. Ahn, W. Yu and S. M. Lee, *ACS Macro Lett.*, 2021, **10**, 492-497.
- S2. A. C. Miller and G. W. Simmons, *Surf. Sci. Spectra*, 1993, **2**, 55-60.
- S3. Z. E. Hu, J. Li, Z. N. Wu, Y. J. Wei, Y. H. Liu, N. Wang and X. Q. Yu, *ACS Biomater. Sci. Eng.*, 2021, **7**, 1394-1402.