

Supplementary Information

Preparation of functional Zein/*Spirulina* protein isolate nanocomposite particles for improved encapsulation of glabridin

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Figure S1. Visual appearance of the aqueous dispersions of zein nanoparticles (ZNPs) and Zein/SPI nanocomposite particles with different mass ratios, as well as the SPI solution. Visible sediments were observed in the aqueous dispersion of Zein/SPI nanocomposite particles with a mass ratio of 1:0.25.

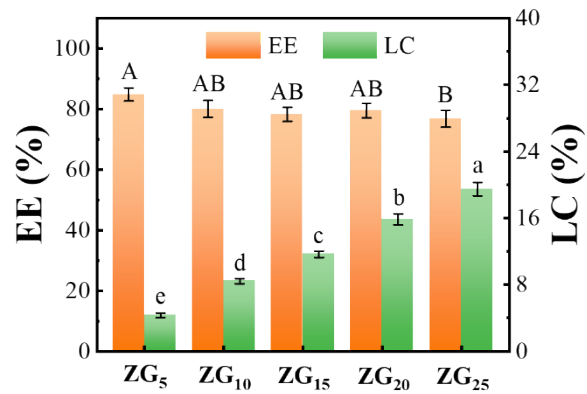


Figure S2. EE and LC of GLA-loaded ZNPs (ZG) prepared with different concentrations of GLA. Different letters represent significant differences ($p < 0.05$).

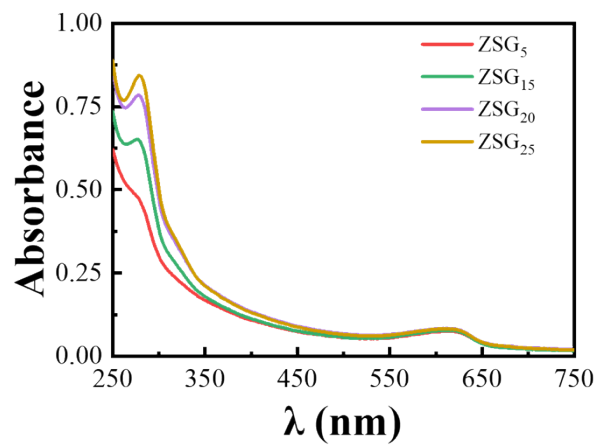


Figure S3. UV-vis spectrum of ZSG₅, ZSG₁₅, ZSG₂₀ and ZSG₂₅

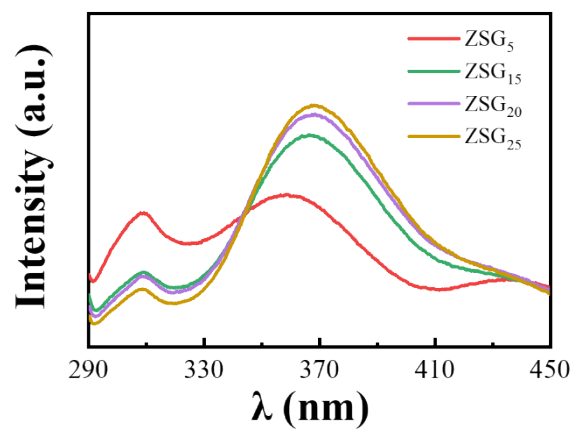


Figure S4. Fluorescence spectrum of ZSG₅, ZSG₁₅, ZSG₂₀ and ZSG₂₅.

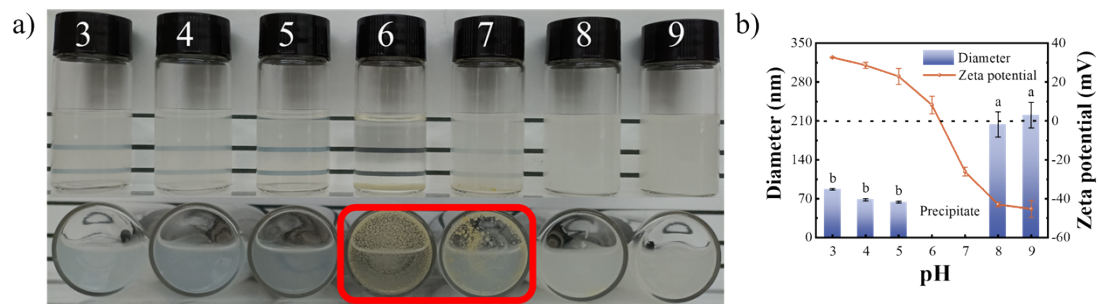


Figure S5. Visual appearance of aqueous dispersions of ZG₁₀ under different pH (a), effect of pH on the average diameter and zeta potential of ZG₁₀ (b). Different letters represent significant differences ($p < 0.05$). Visible sediments were observed in the aqueous dispersions of ZG₁₀ at pH of 6 and 7.

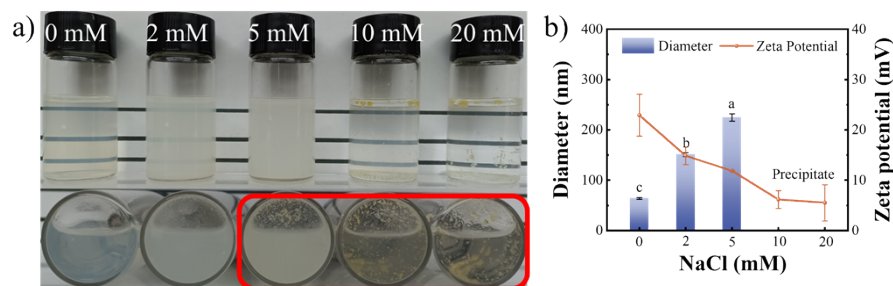


Figure S6. Visual appearance of aqueous dispersions of ZG₁₀ under different concentration of NaCl (a), effect of NaCl on the average diameter and zeta potential of ZG₁₀ (b). Different letters represent significant differences ($p < 0.05$). Visible sediments were observed in the aqueous dispersions of ZG₁₀ at salt concentrations of 5, 10, and 20 mM.

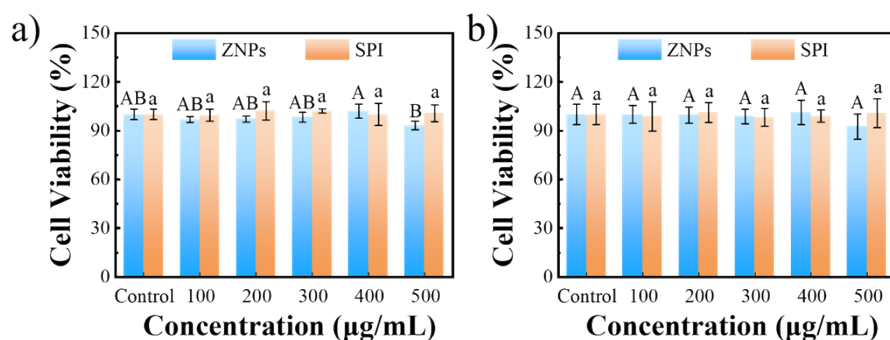


Figure S7. Cell viability of HaCaT cells (a), and NCM-460 cells (b) treated with different concentrations of ZNPs and SPI, respectively. Different letters represent significant differences ($p < 0.05$).



Figure S8. Visual appearance of aqueous dispersion of ZG₁₀ after releasing for 12 h