

Supplementary Information

Photochromic and photothermal hydrogel derived from natural amino acid and heteropoly acid

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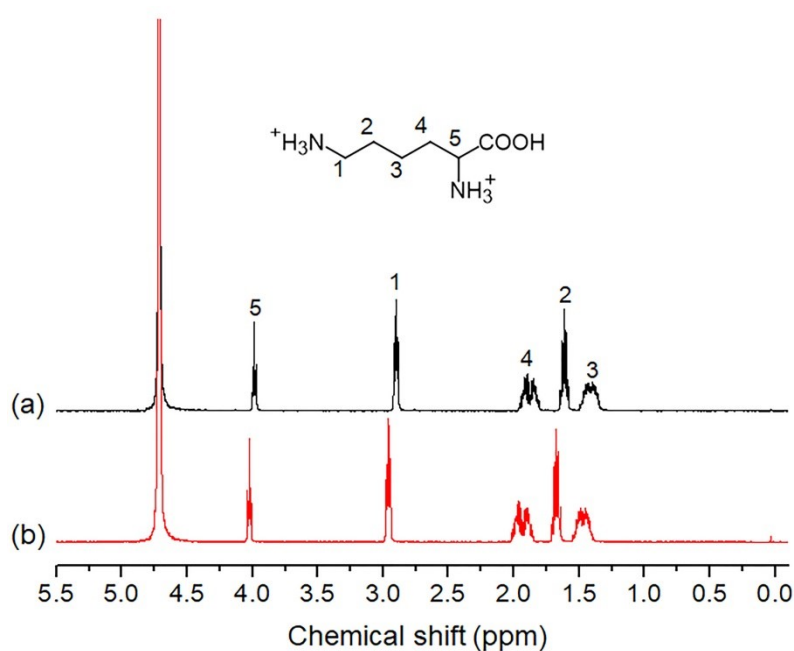


Fig. S1 ¹H NMR spectra of *L*-Lys (a) and *L*-Lys/HSiW (b) in D₂O (pH = 1.8).

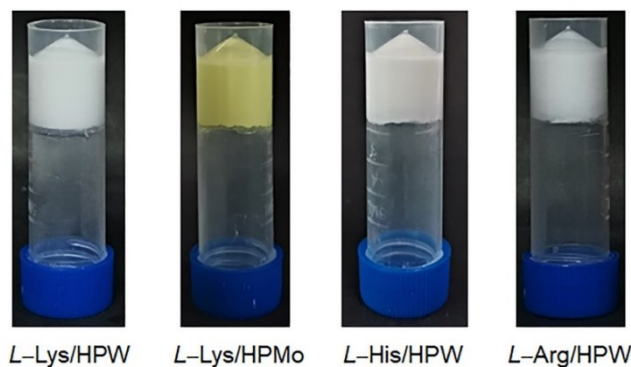


Fig. S2 Photographs of the *L*-Lys/HPW, *L*-Lys/HPMo, *L*-His/HPW and *L*-Arg/HPW hydrogels (pH = 1.8).

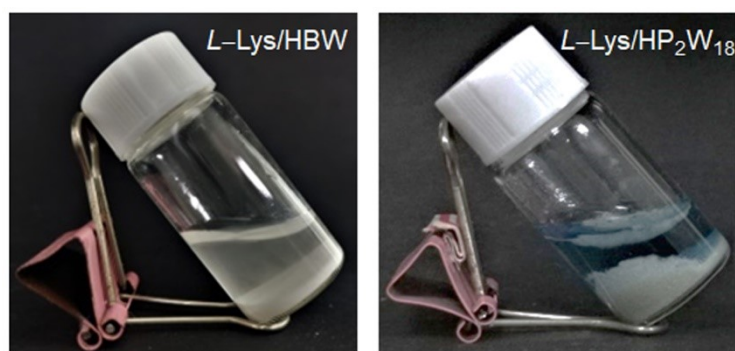


Fig. S3 Photographs of *L*-Lys/HBW and *L*-Lys/HP₂W₁₈ precipitates (pH = 1.8).

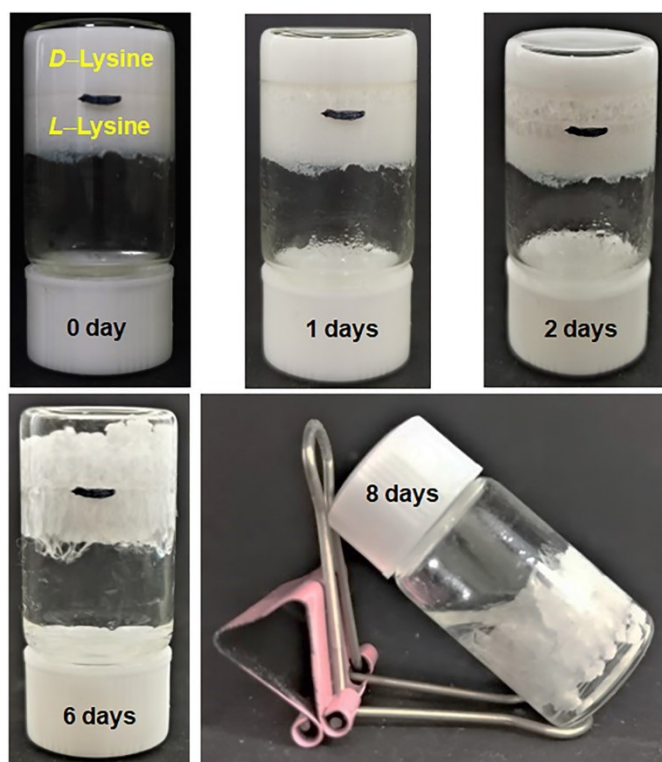


Fig. S4 Photographs of *L*-Lys/HSiW hydrogel placed on the surface of *D*-Lys/HSiW hydrogel. (*DL*-Lys/HSiW hydrogel has the same concentration and pH). After aging one day, a thin and cottony layer at the contacted interface could be observed clearly. With increasing the aging time, the cottony layer became thicker and thicker, and finally the original hydrogel phase disappeared completely and transferred into cottony precipitate.

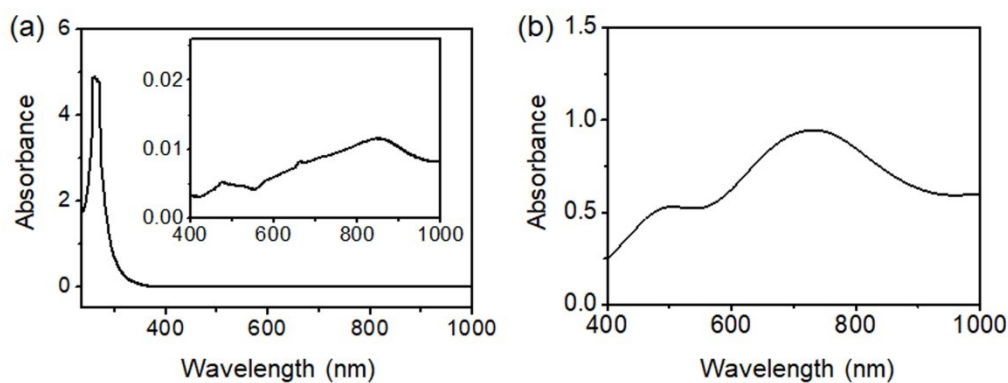


Fig. S5 (a) UV-Vis spectrum of the diluted L -Lys/ HSiW_{red} solution with 0.02% weight concentration of L -Lys. The insert image is the UV-Vis spectrum in the range of 400-1000 nm. (b) UV-Vis spectrum of the L -Lys/ HSiW_{red} sol by heating the corresponding hydrogel (with 1.3% weight concentration of L -Lys) at 65 °C.

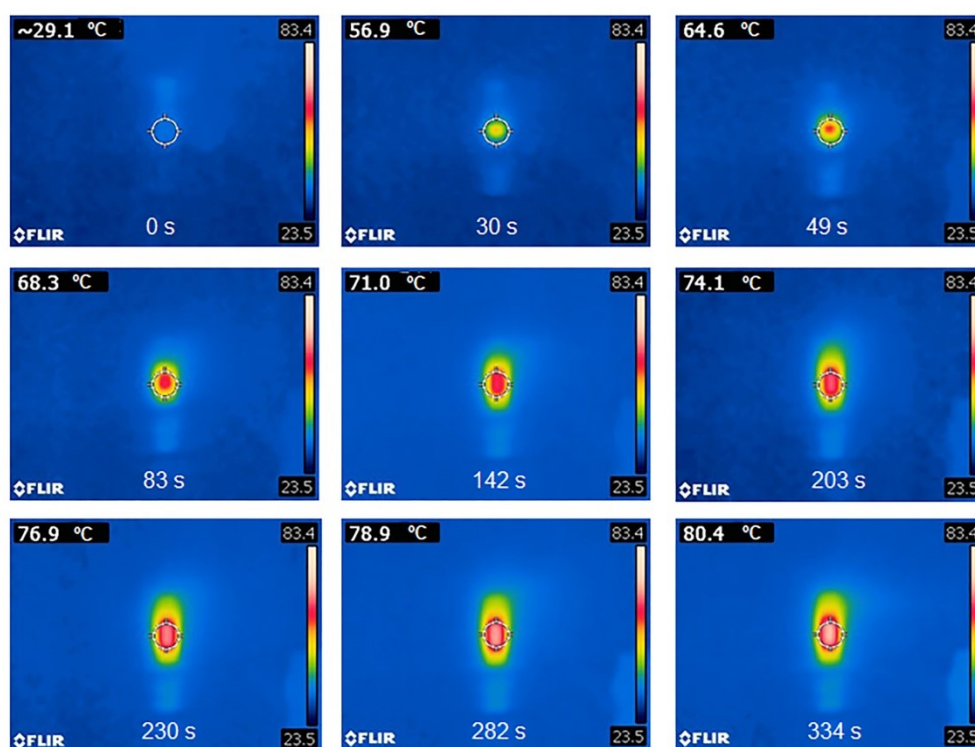


Fig. S6 IR thermal images of the deep blue L -Lys/ HSiW_{red} hydrogel irradiated by 808 nm laser for different time.

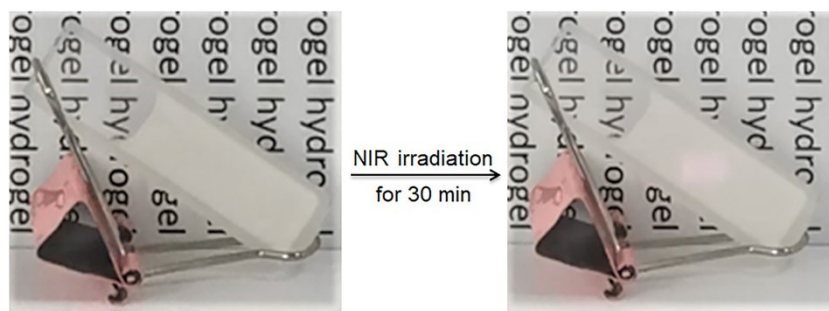


Fig. S7 Photographs of the as-prepared *L*-Lys/HSiW hydrogel before and after irradiation with 808 nm laser for 30 min.

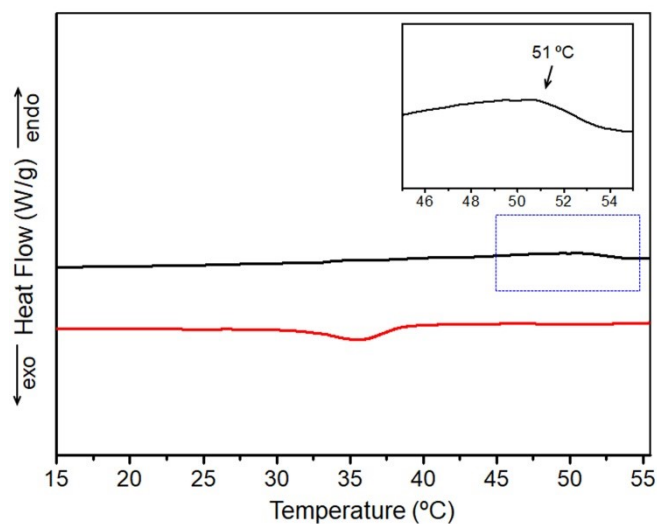


Fig. S8 DSC curves of the *L*-Lys/HSiW_{red} hydrogel recorded on the first cooling and the second heating process. The insert image is a magnified DSC curve on the second heating process with a temperature range of 45 ~ 55 °C.

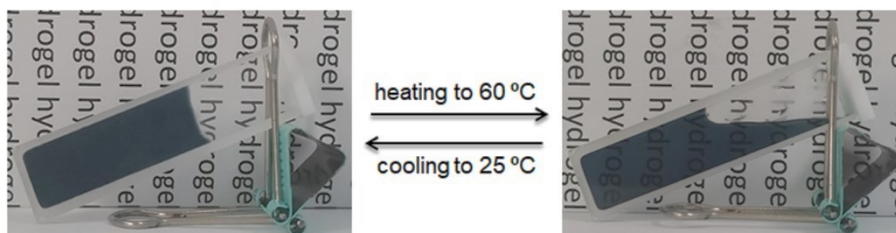


Fig. S9 Photographs of temperature-dependent phase transition of *L*-Lys/HSiW_{red} between gel and sol state.

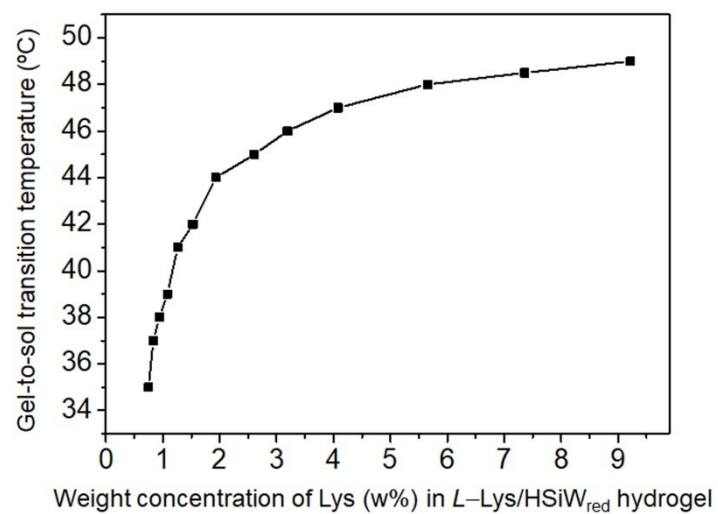


Fig. S10 Phase transition temperature of *L*-Lys/HSiW_{red} hydrogel as a function of the weight concentration of *L*-Lys.