Supplementary Information for

Highly flexible heparin-modified chitosan/graphene oxide hybrid hydrogel as a super bilirubin adsorbent with excellent hemocompatibility

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Adsorption isotherm models

The adsorption data were fitted with Langmuir model and Freundlich model, which were expressed as:

Langmuir model: $Q_e = \frac{Q_m C_e}{K_d + C_e}$

Freundlich model: $Q_e = K_F C_e^{1/n}$

where Q_e (mg/g) and C_e (mg/L) were the amount of adsorbed bilirubin per unit mass of adsorbent and bilirubin concentration at equilibrium, respectively. Q_m (mg/g) was the maximum amount of bilirubin per unit mass of adsorbent to form a complete monolayer on the surface. K_d (mg/L) was a constant related to the affinity of the binding sites. K_F and $1/n$ were the Freundlich model constants, indicating capacity and intensity of adsorption, respectively.

Table S1. Parameters of Langmuir and Freundlich isotherms.

Langmuir isotherm model			Freundlich isotherm model		
Q_m (mg/g)	K_d (mg/L)	R^2	K_F	$1/n$	R^2
92.6	15.2	0.9955	11.80	0.45	0.9696

Table S2. Albumin and total protein concentrations before and after adsorption on hep-CS/GH in bilirubin-enriched serum (bilirubin initial concentration: 305.5 mg/L)[a].

Protein	C_0 (mg/mL)	C_1 (mg/mL)	Clearance (%)
Albumin	31.2	30.1	3.5%
Total proteins	63.9	61.8	3.3%

[a]C_0 and C_1 = albumin and total protein concentrations before and after adsorption, respectively; Clearance=$(1- C_1/C_0)\times 100\%$

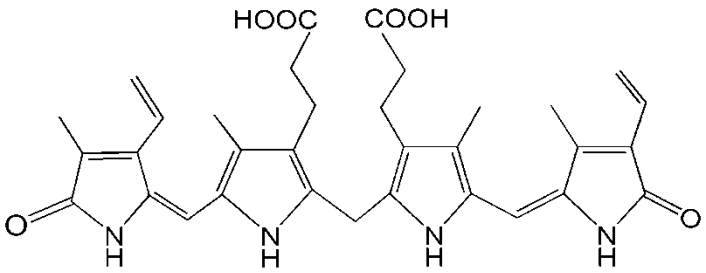

Fig. S1. Chemical structure of bilirubin.

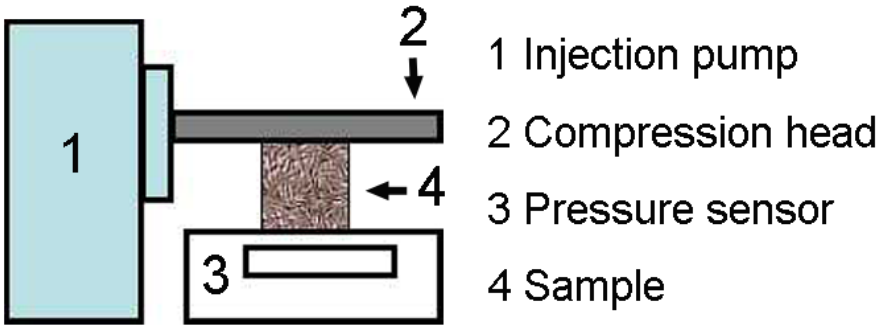

Fig. S2. Schematic illustration of the equipment for the compressive test. The injection pump (TJ-3A/W0109-1B, Baoding Longer Precision Pump Co., Ltd.) droved the compression head up and down at a preset speed. The load on the sample was recorded using a pressure sensor.

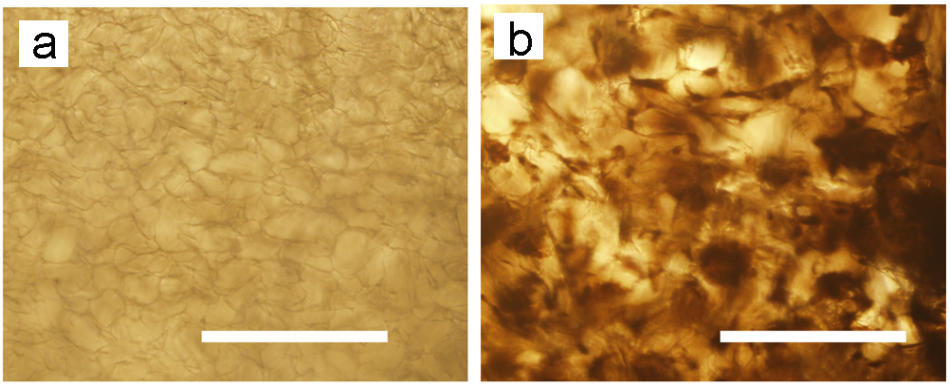

Fig. S3. Optical microscopy images of (a) CSH and (b) CS/GH (scale bar 200 μm).

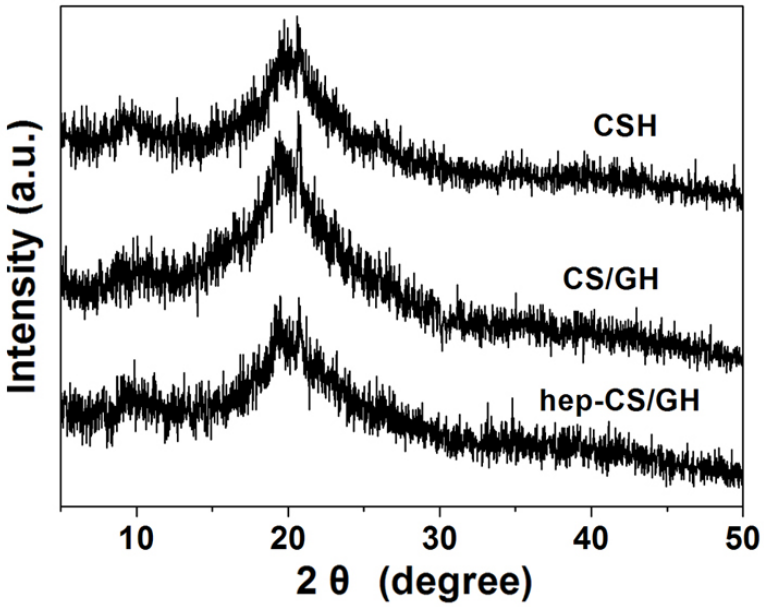

Fig. S4. XRD patterns of CSH, CS/GH and hep-CS/GH.

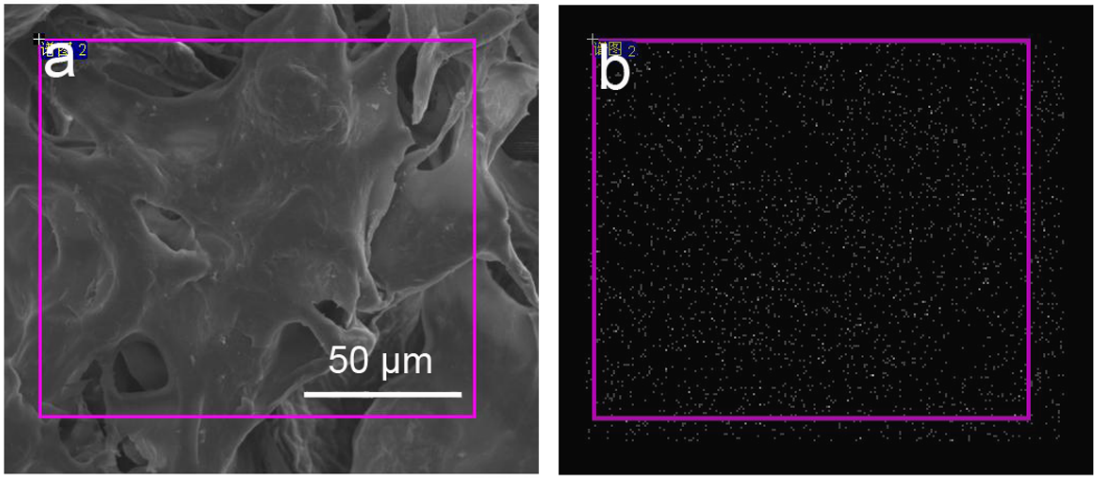

Fig. S5. (a) SEM image of CS/GH, and (b) the corresponding elemental mapping image of S. It was obvious that the brightness of sulfur in CS/GH was much weaker than that of hep-CS/GH, suggesting the presence of heparin in hep-CS/GH.

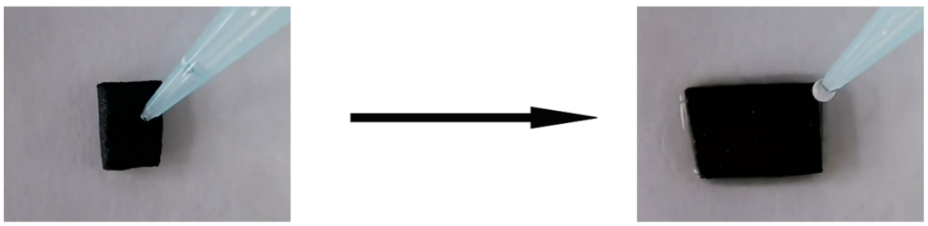

Fig. S6. Shape recovery of the hep-CS/GH. The water in the hep-CS/GH was squeezed out and the compressed hep-CS/GH could be folded, but it could recover the original shape after uptaking the water again.

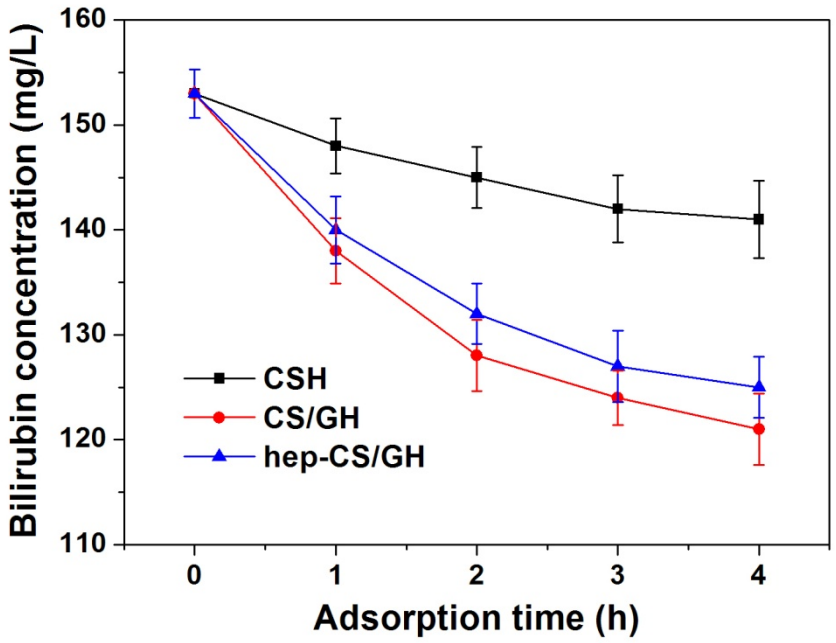

Fig. S7. Adsorption of bilirubin from bilirubin-enriched serum at the initial bilirubin concentration of 153.4 mg/L (mean ± S.D, n = 3)