Supporting Information

Glow discharge electrolysis plasma induced synthesis of cellulose-based ionic hydrogels and their multiple response behaviors

Wenming Zhang,*[a] Zhu Sha,[a] Ying Huang,[a] Yunping Bai[a], Ning Xi[a] and Yucang Zhang,*[b]

[a] *College of Physics Science and Technology, Hebei University, Baoding, Hebei province, China. Fax: +86 312 5079473; Tel: +86 312 5079473; E-mail: wmzhang@hbu.edu.cn*

[b] *College of Materials and Chemical Engineering, Hainan University, Haikou province, China. Fax: +86 898 66279219; Tel: +86 898 66279219; E-mail: yczhang@hainu.edu.cn*

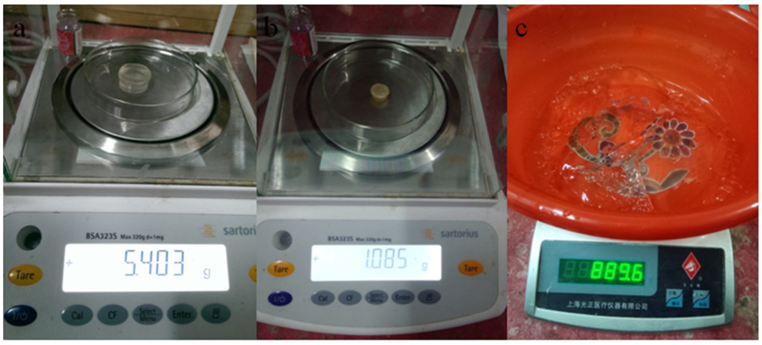

Figure S1. Photographs of wet hydrogel (a), dried hydrogels (b), and hydrogel after swelling equilibrium (c).

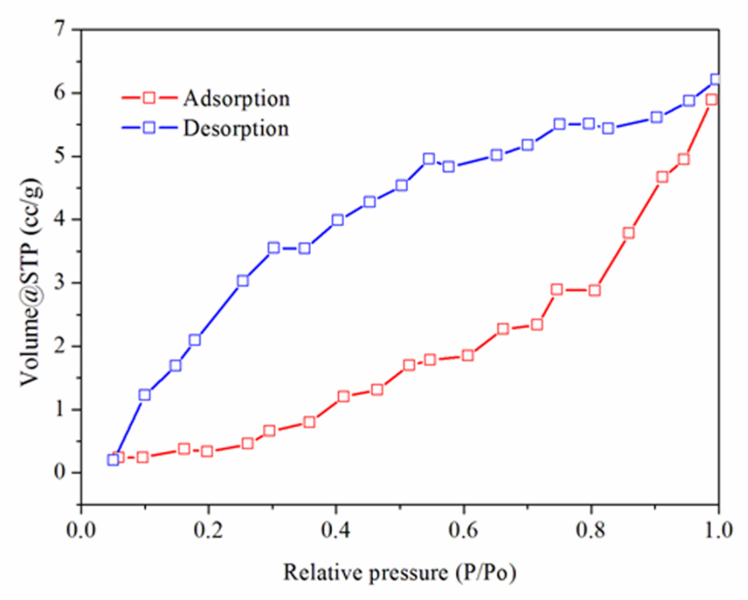

Figure S2. Nitrogen sorption isotherm of cellulose-based ionic hydrogel (the discharge voltage and discharge time is 570 V and 90 s, respectively).

Figure S2 shows the N_2 sorption isotherm of the freezed dried cellulose-based ionic hydrogel after absorbing water sufficiently. The sample was measured using automated surface area and pore size analyzer (Quantachrome Autosorb-1 MP). The surface area was 2.131 m^2/g.

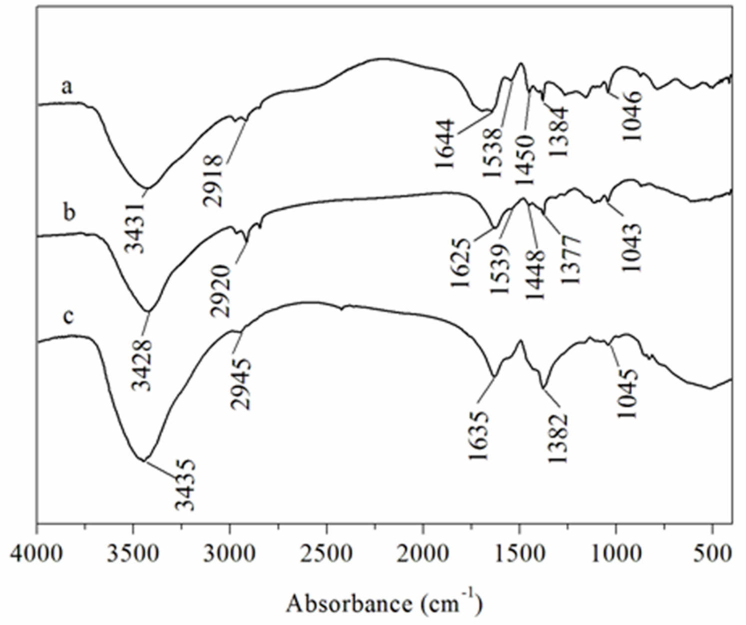

Figure S3. FT-IR of cellulose-based ionic hydrogels after adsorbing heavy metal ions (a) Na^{+}, (b) Zn^{2+}, and (c) Fe^{3+}.

Figure S3 shows the infrared spectrogram of cellulose-based ionic hydrogels after adsorbing heavy metal ions. As the Na^{+}, Zn^{2+}, Fe^{3+} ions were adsorbed by cellulose-based ionic hydrogels, the peak at 1722 cm^{-1} (C=O stretching vibration) (Fig. 7b) was disappeared completely implying that complexation was possible and new peaks appeared at 1644, 1625, 1635 cm^{-1} on curve (a), (b) and (c), respectively.[1] In addition, the peaks at 1543 and 1456 cm^{-1} (the stretching vibration of COO^{-}) (Fig. 7b) were shifted to lower wavenumbers after adsorbing Na^{+}, Zn^{2+} metal ions, or even disappeared after adsorbing Fe^{3+}. Besides, the intensity of the peaks of Zn^{2+} was weaker than Na^{+}. All results indicated that oxygen atoms in cellulose-based ionic hydrogels donated unshared electron pairs to the metal ions to form coordinate-covalent bonds and the coordination between Fe^{3+}/Zn^{2+} and carboxyl group was obvious stronger than that Na^{+}.[2-4]

References:

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