Electronic Supporting Information (ESI)

A facile strategy to fabricate high-stretchable self-healing poly(vinyl alcohol) hybrid hydrogels based on metal-ligand interaction and hydrogen bonding

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Table S1 The equilibrium water content (*EWC*) of hydrogels obtained by swelling test and the actual amount of water content (*WC*) in hydrogels in self-healing process.

Sample	*WC* (%)	*EWC* (%)
PVA-$Cu_{0.0025}$	87.7±1.6	96.5±0.3
PVA-$Cu_{0.01}$	85.5±0.7	95.6±0.3
PVA-$Cu_{0.02}$	84.4±0.1	93.2±0.2
PVA-$Cu_{0.035}$	86.8±0.1	93.4±0.17
PVA-$Cu_{0.05}$	86.3±0.5	91.8±0.04
PVA-Cu-Sep2	84.4±0.1	94.5±0.2
PVA-Cu-Sep4	86.5±0.6	94.0±0.2
PVA-Cu-Sep6	85.4±0.3	93.1±0.1
PVA-Cu-Sep8	85.9±0.5	93.4±0.4
PVA-Cu-Sep10	86.9±1.3	93.4±0.4

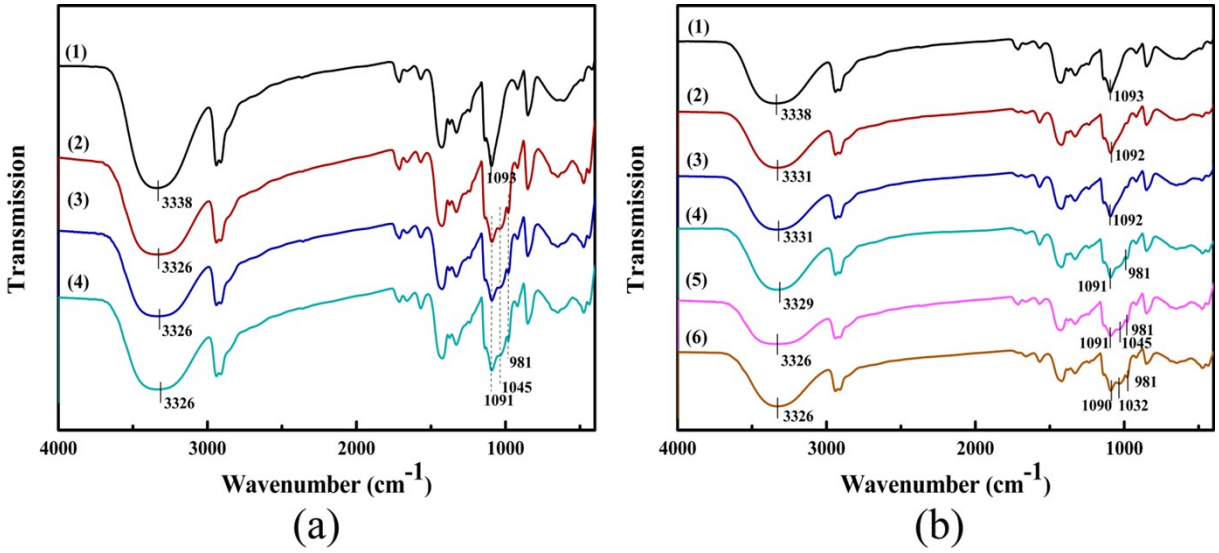

Fig. S1 (a) The FT-IR analyses confirmed the influence of basic environment on the hydrogen bonds between the hydroxyls of PVA and the silanol groups: FT-IR spectra of PVA (1) and PVA-Sep8 in original state (2), PVA-Sep8 with the pH at 7~8 (3) and PVA-Sep8 with the pH at 8~9 (4). (b) FT-IR spectra of PVA -Sep films with different Sep content: (1) 0 *wt*%, (2) 2 *wt*%, (3) 4 *wt*%, (4) 6 *wt*%, (5) 8 *wt*% and (6) 10 *wt*%% Sep, with the pH at 7~8.

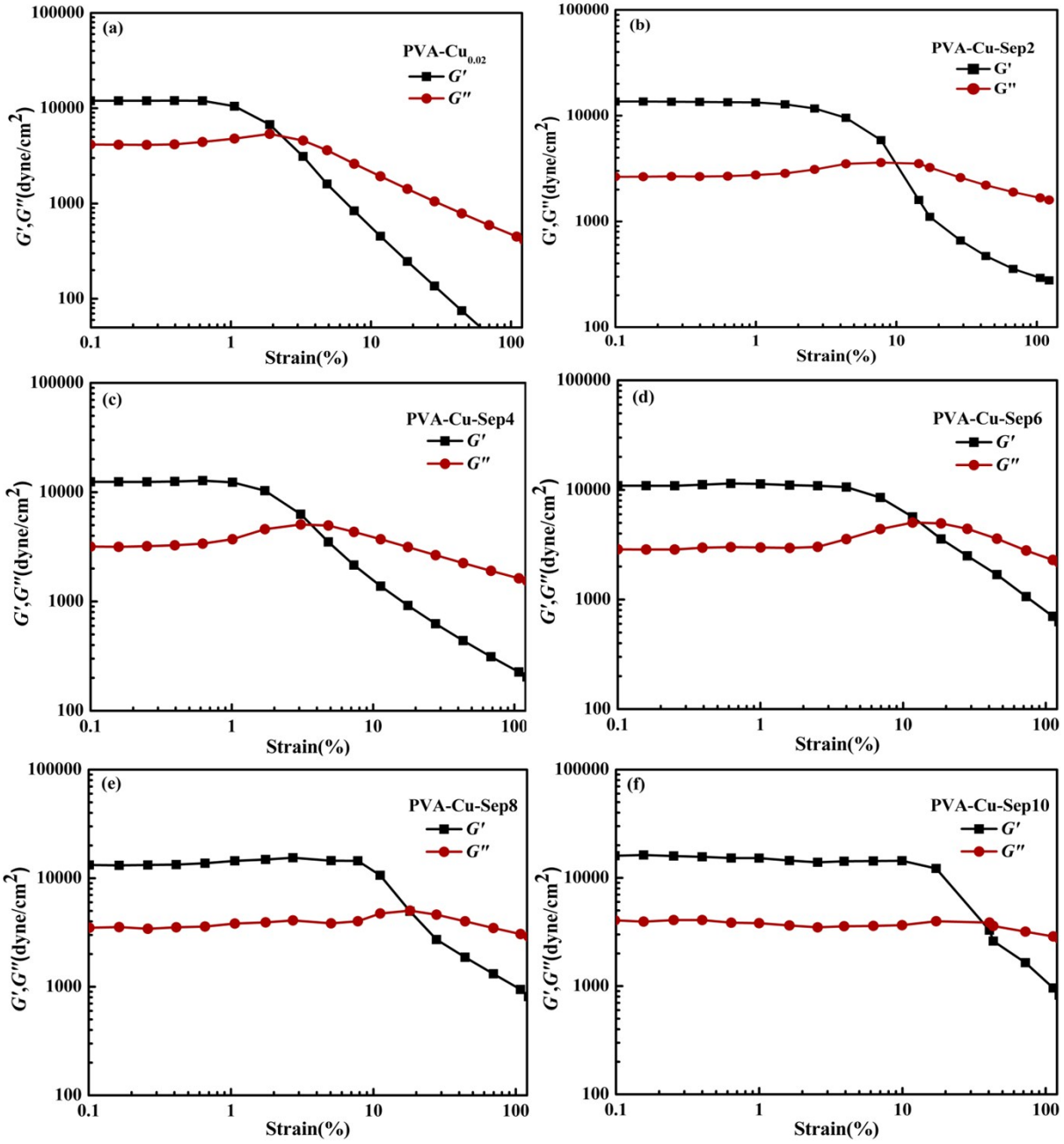

Fig. S2 The strain sweep tests of hydrogels. *G′* and *G″* of (a) PVA-$Cu_{0.02}$,(b)PVA-Cu-Sep2, (c)PVA-Cu-Sep4, (d)PVA-Cu-Sep6, (e)PVA-Cu-Sep8 and (f)PVA-Cu-Sep10 hydrogels as a function of strain (0.1-120%).

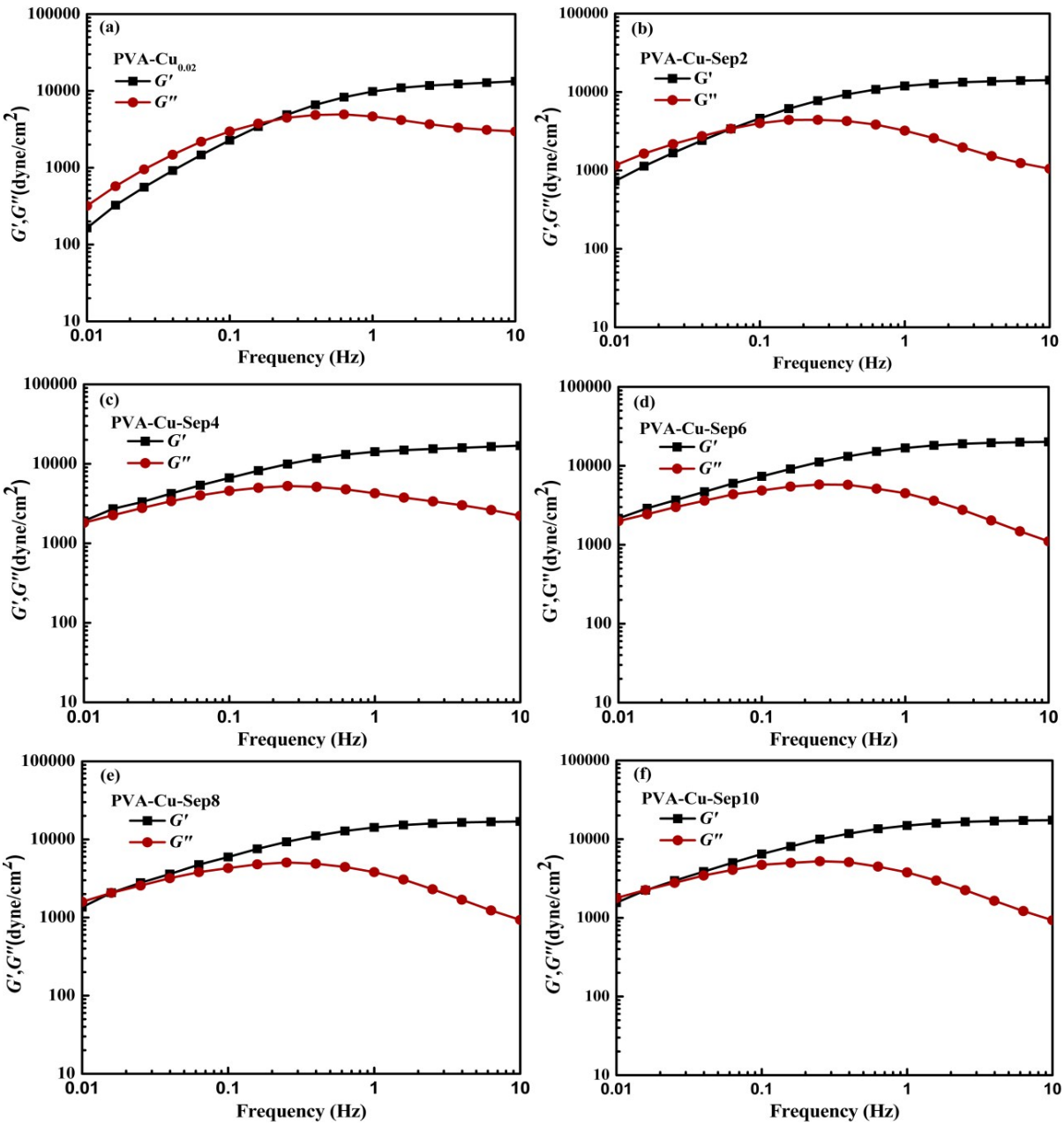

Fig. S3 The frequency sweep tests of hydrogels. *G′* and *G″* of (a) PVA-$Cu_{0.02}$, (b) PVA-Cu-Sep2, (c) PVA-Cu-Sep4, (d) PVA-Cu-Sep6, (e) PVA-Cu-Sep8 and (f) PVA-Cu-Sep10 hydrogels as a function of frequency (0.01-100 Hz).

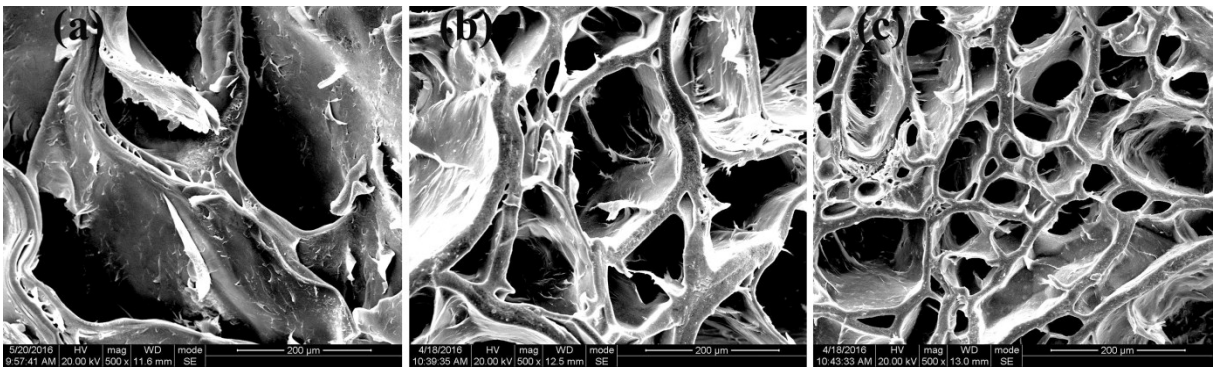

Fig. S4 SEM macroimages of (a) PVA-$Cu_{0.02}$, (b) PVA-Cu-Sep4 and (c) PVA-Cu-Sep8 hydrogel.

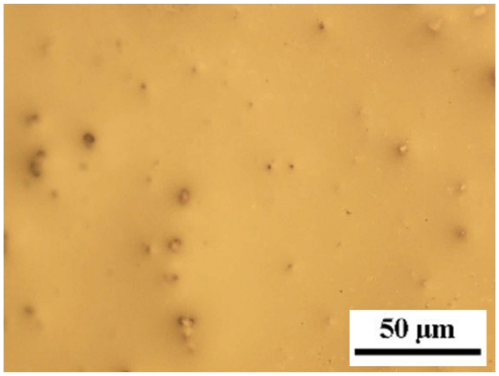

Fig. S5 The macro-image of the cut surface of PVA-Cu-Sep8 hydrogel.