Supporting Information for

Recyclable, Stretchable and Conductive Double Network Hydrogels towards Flexible Strain Sensors

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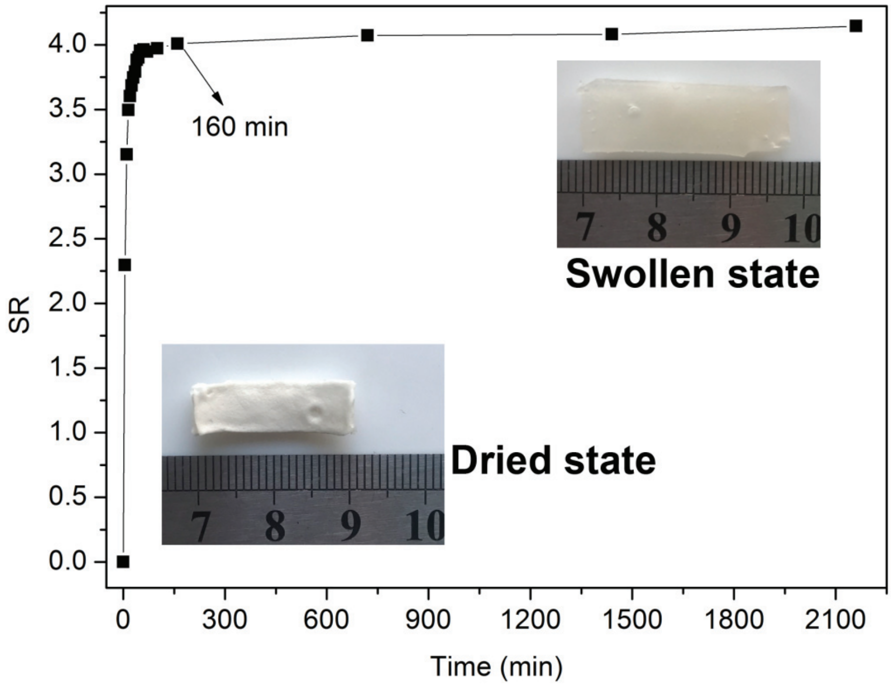


Figure S1. Swelling curve of dried PVA/PAANa(5)-Tb^{3+}(0.5) DN-hydrogel in water at room temperature. Insets show the phtographs of a DN-hydrogel strip in dried state and swollen state.

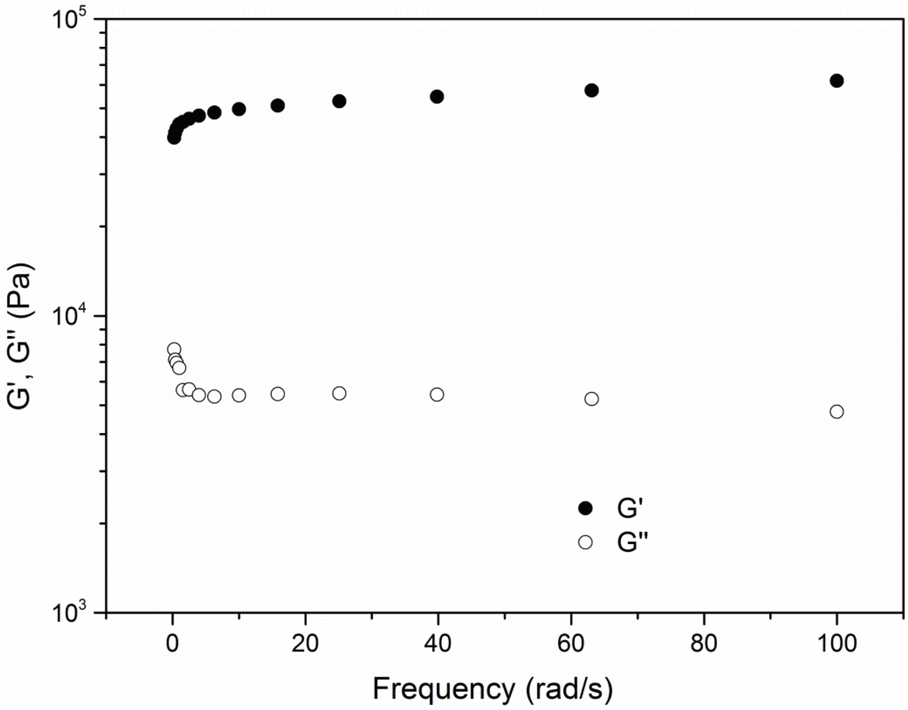


Figure S2. Strain-controlled dynamic frequency sweep test of storage moduli (G') and loss moduli (G″) of fully swollen PVA/PAANa(5)-Tb^{3+}(0.5) DN-hydrogel.

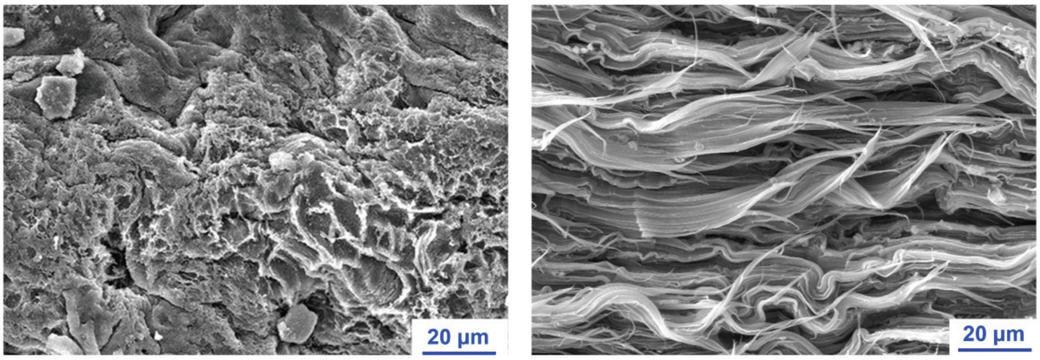
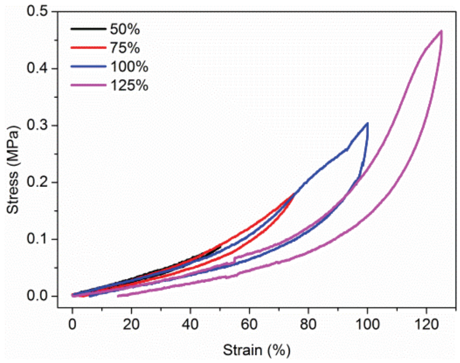
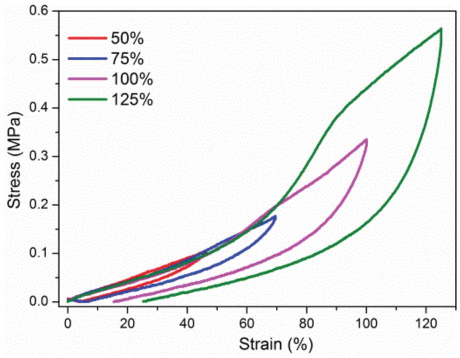


Figure S3. Typical morphology of brittlely fractured as-prepared DN-hydrogels (left) and DN-hydrogels fractured by notch-sensitivity test (right).



(a)



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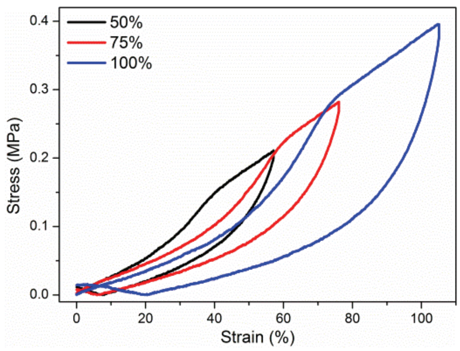
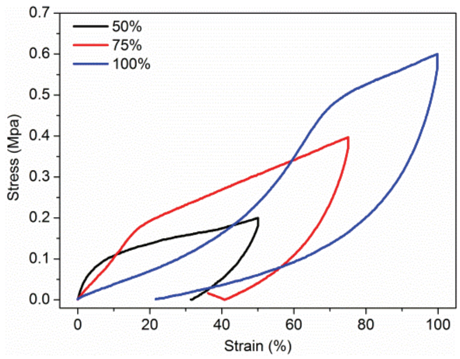
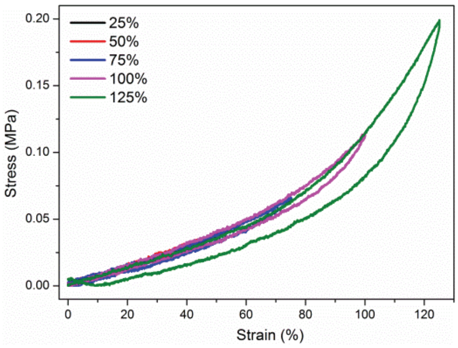


(c)

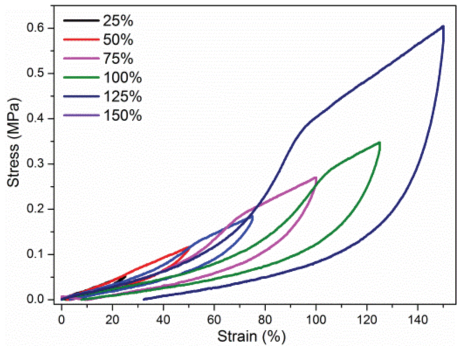


(d)

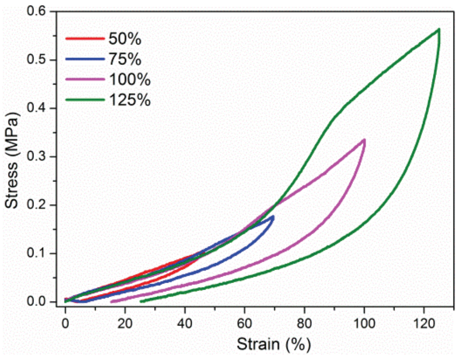
Figure S4. Energy dissipation ability of PVA hydrogel and DN-hydrogels with different PAANa contents. (a) Tensile loading-unloading curves of PVA hydrogel (PAANa 0 wt%) at different strains. (b) PVA/PAANa(5)-Tb^{3+}(0.5) DN-hydrogel. (c) PVA/PAANa(15)-Tb^{3+}(0.5) DN-hydrogel. (d) PVA/PAANa(30)-Tb^{3+}(0.5) DN-hydrogel.



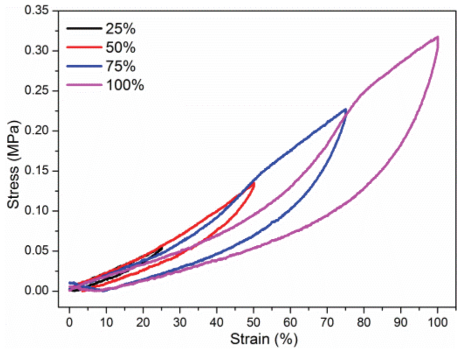
(a)



(b)



(c)



(d)

Figure S5. Energy dissipation ability of S-hydrogel and DN-hydrogels prepared under different concentrations of Tb^{3+}. (a) Tensile loading-unloading curves of S-hydrogel (Tb^{3+} 0 mol/L) at different strains. (b) PVA/PAANa(5)-Tb^{3+}(0.1) DN-hydrogel. (c) PVA/PAANa(5)-Tb^{3+}(0.5) DN-hydrogel. (d) PVA/PAANa(5)-Tb^{3+}(1.0) DN-hydrogel.

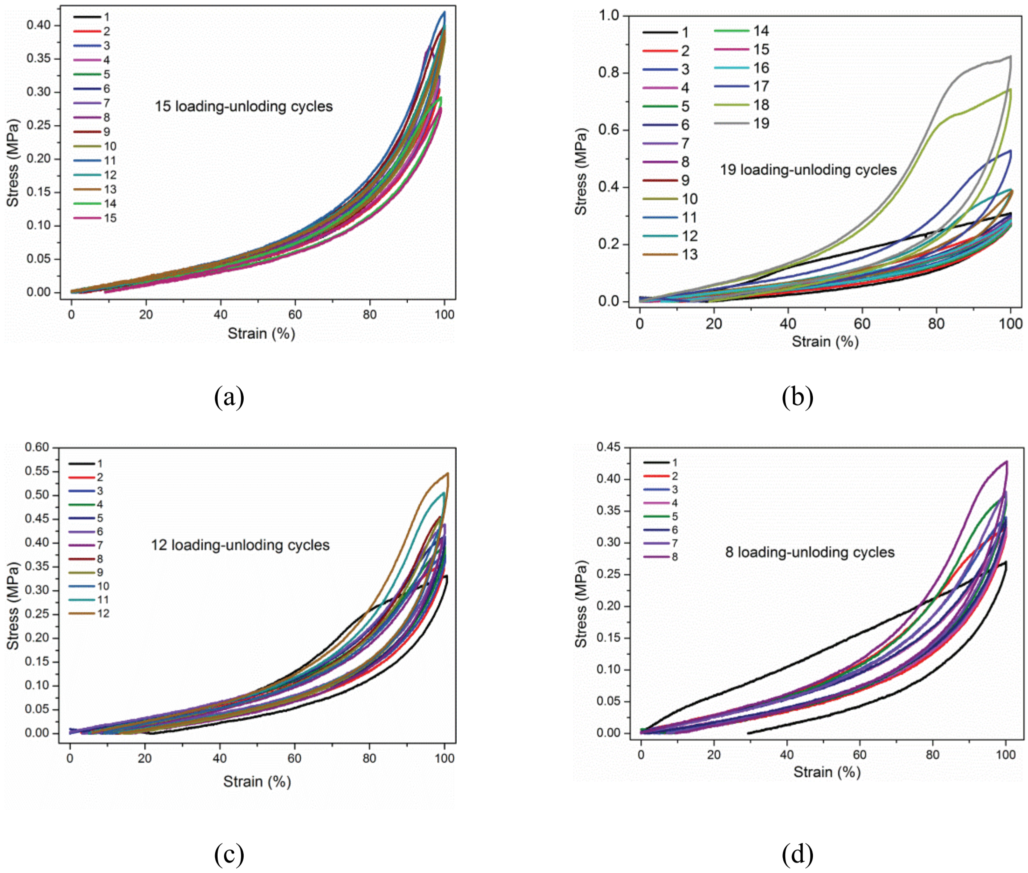


Figure S6. Fatigue resistance of PVA hydrogel and DN-hydrogels with different PAANa contents. (a) Cyclic tensile loading-unloading curves of PVA hydrogel at a strain of 100%. (b) PVA/PAANa(5)-Tb^{3+}(0.5) DN-hydrogel. (c) PVA/PAANa(15)-Tb^{3+}(0.5) DN-hydrogel. (d) PVA/PAANa(30)-Tb^{3+}(0.5) DN-hydrogel.

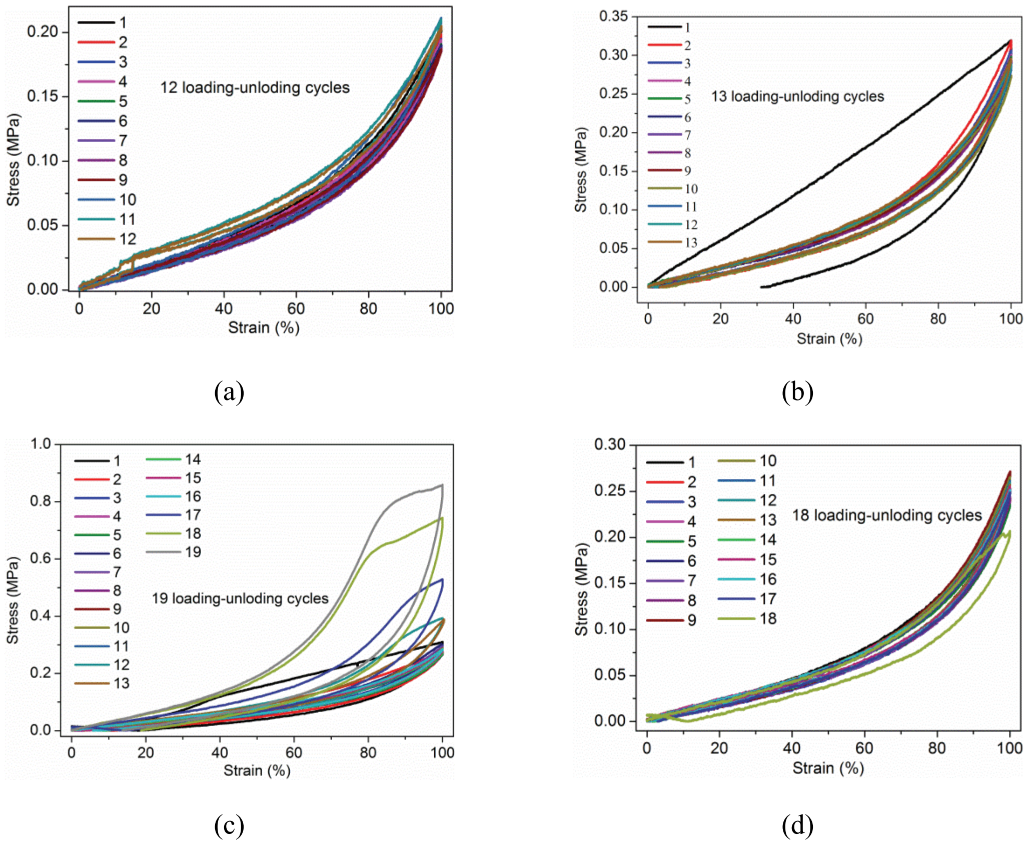


Figure S7. Fatigue resistance of S-hydrogel and DN-hydrogels prepared under different concentrations of Tb^{3+}. (a) Tensile loading-unloading curves of S-hydrogel (Tb^{3+} 0 mol/L) at a strain of 100%. (b) PVA/PAANa(5)-Tb^{3+}(0.1) DN-hydrogel. (c) PVA/PAANa(5)-Tb^{3+}(0.5) DN-hydrogel. (d) PVA/PAANa(5)-Tb^{3+}(1.0) DN-hydrogel.

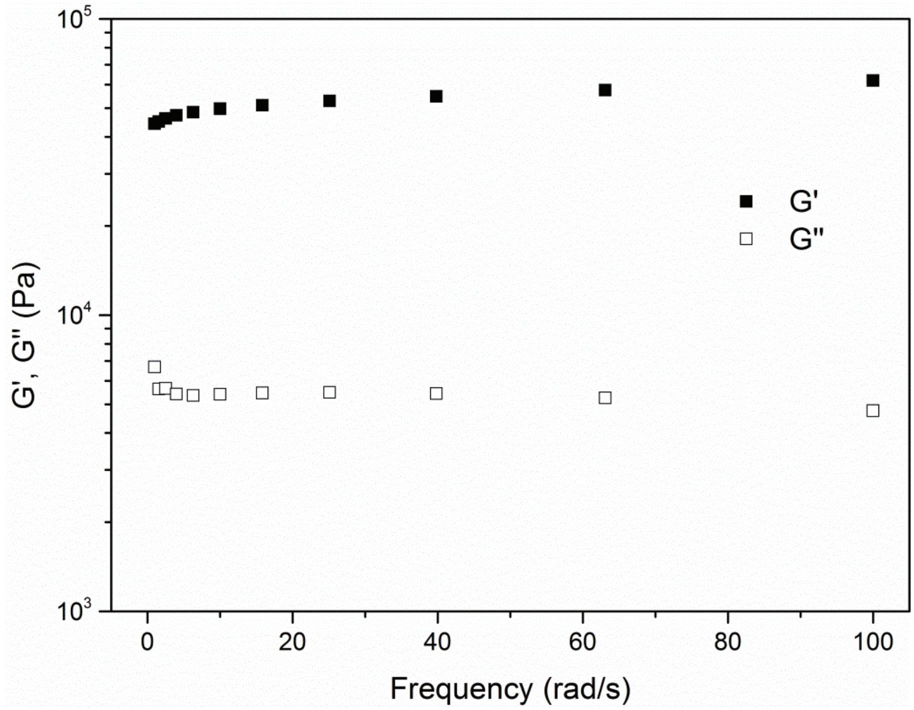
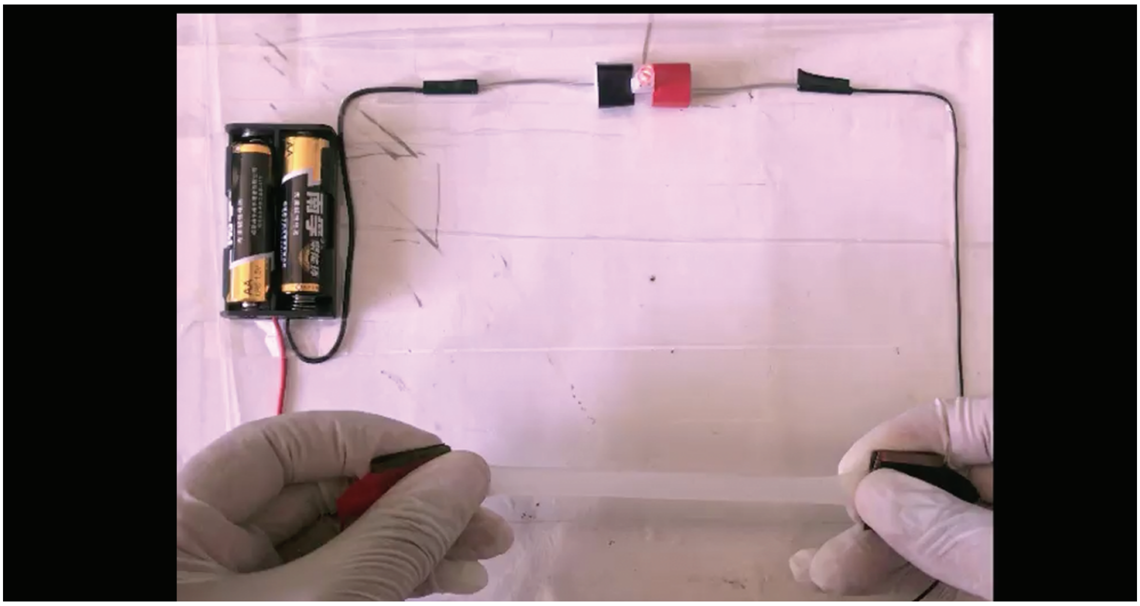


Figure S8. Strain-controlled dynamic frequency sweep test of storage moduli (G') and loss moduli (G″) of recycled PVA/PAANa(5)-Tb^{3+}(0.5) DN-hydrogel.



Video S1. This video displays the brightness change of LED connected into a circuit when the PVA/PAANa(5)-Tb^{3+}(0.5) DN-hydrogel strip is periodically stretched.