Supporting Information for

Stretchable Multifunctional Hydrogel for Sensing Electronics with Effective EMI Shielding Property

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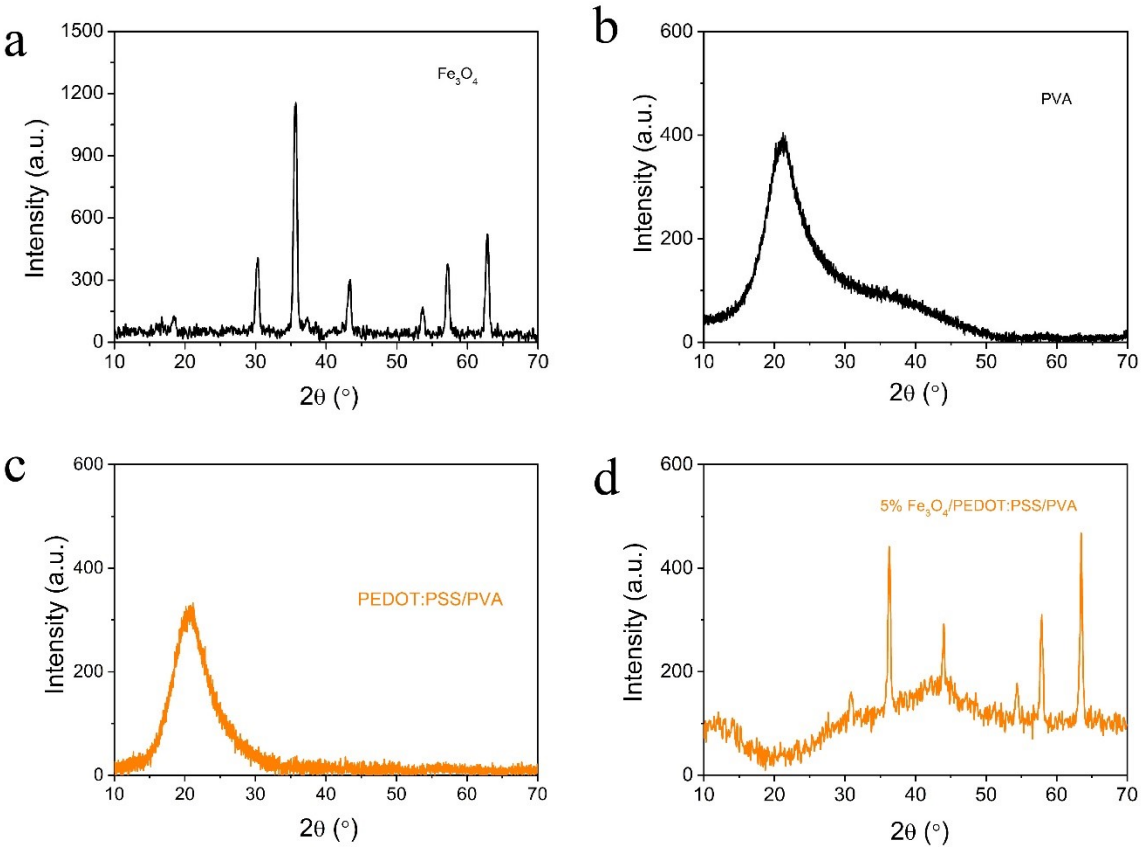

Fig. S1. XRD patterns of (a) Fe_3O_4, (b) PVA, (c) PEDOT: PSS/PVA, and (d) the 5% Fe_3O_4/PEDOT: PSS/PVA hydrogel, respectively.

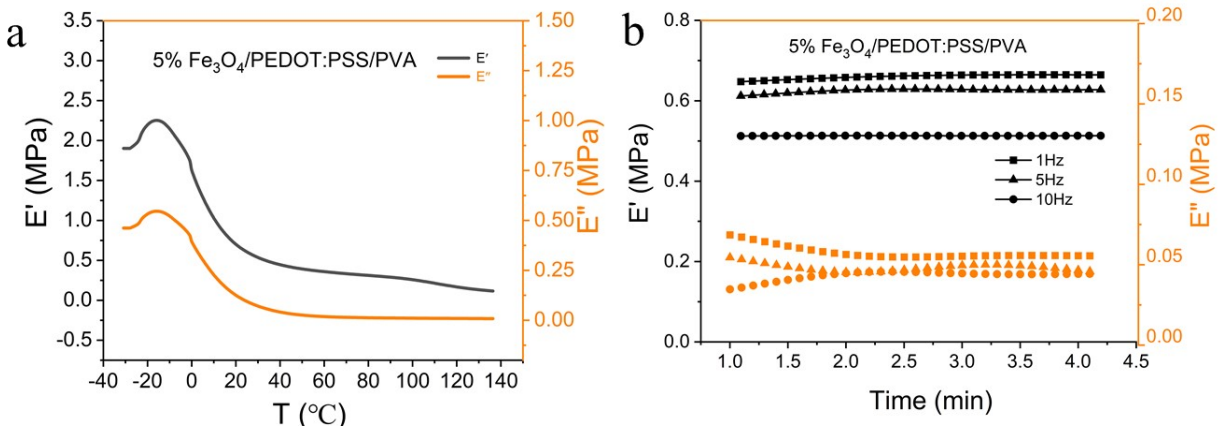

Fig. S2. (a) The dynamic mechanical analysis of the storage moduli (E′) and loss moduli (E″) for the 5% Fe_3O_4/PEDOT: PSS/PVA as a function of temperature ranging from -45 to 125℃. (b) The dynamic mechanical analysis results of the storage moduli (E′) and loss moduli (E″) of representative hydrogel 5% Fe_3O_4/PEDOT: PSS/PVA in 1 Hz, 5 Hz and 10 Hz.

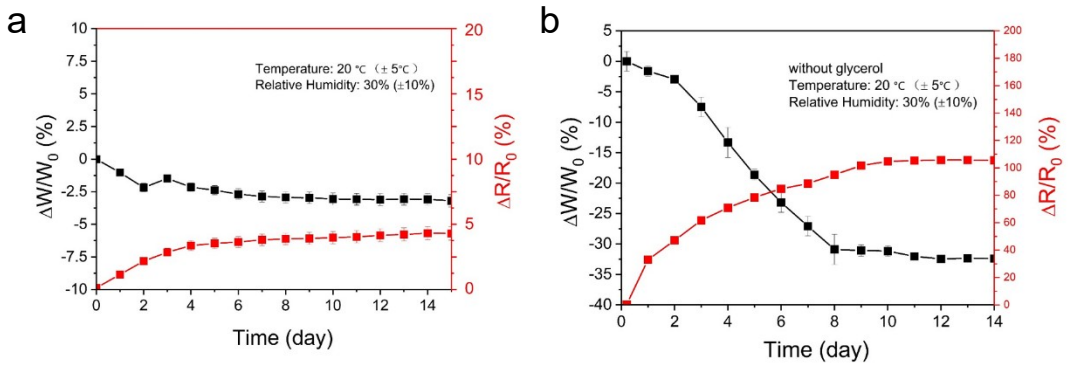

Fig. S3. The mass loss of the multifunction hydrogels with (a) and without glycerol (b) placed in ambient conditions at 20 °C (±5) and 30% (±10%) humidity for 15 days. The relative resistance change ($\Delta R/R_0$) of the multifunction hydrogel with (a) and without glycerol (b) placed in ambient conditions at 20 °C (±5) and 30% (±10%) humidity for 14 days.

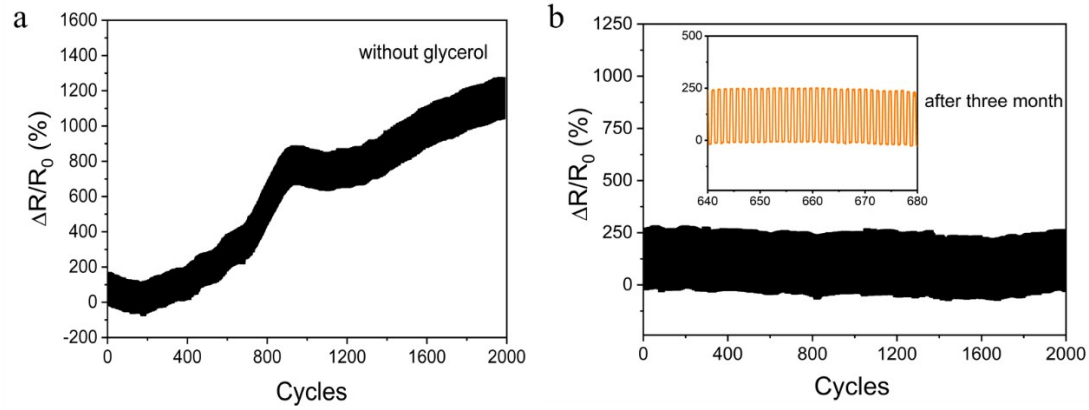

Fig. S4. (a) The resistance signal of the hydrogel without glycerol was observed in the detection of 2000 loading-unloading cycles. (b) The stable and reproducible response of 5% Fe_3O_4/PEDOT: PSS/PVA hydrogel was observed in the detection of 2000 loading-unloading cycles after three months.

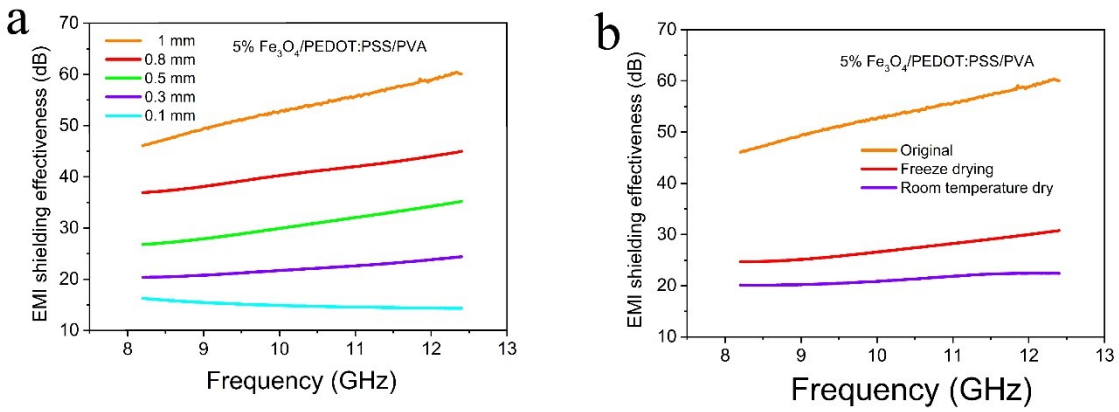

Fig. S5. (a) The EMI shielding effectiveness of 5%Fe_3O_4/PEDOT: PSS/PVA multifunction hydrogels films with different thicknesses. (b) The EMI shielding effectiveness of 5%Fe_3O_4/PEDOT: PSS/PVA multifunction hydrogels in a different state.

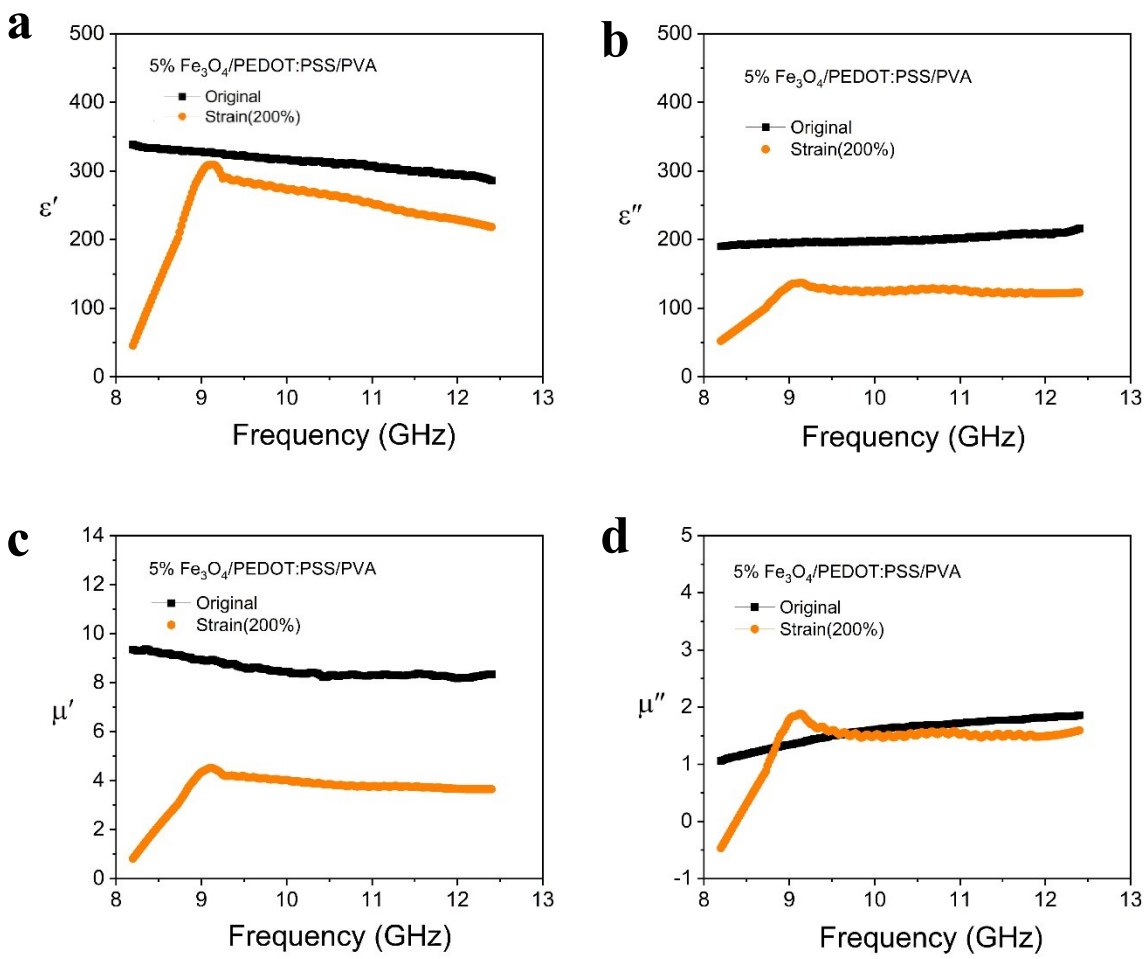

Fig. S6. (a-d) The relative complex permittivity and permeability of 5% Fe_3O_4/PEDOT: PSS/PVA multifunction hydrogels under the strain of 200%.

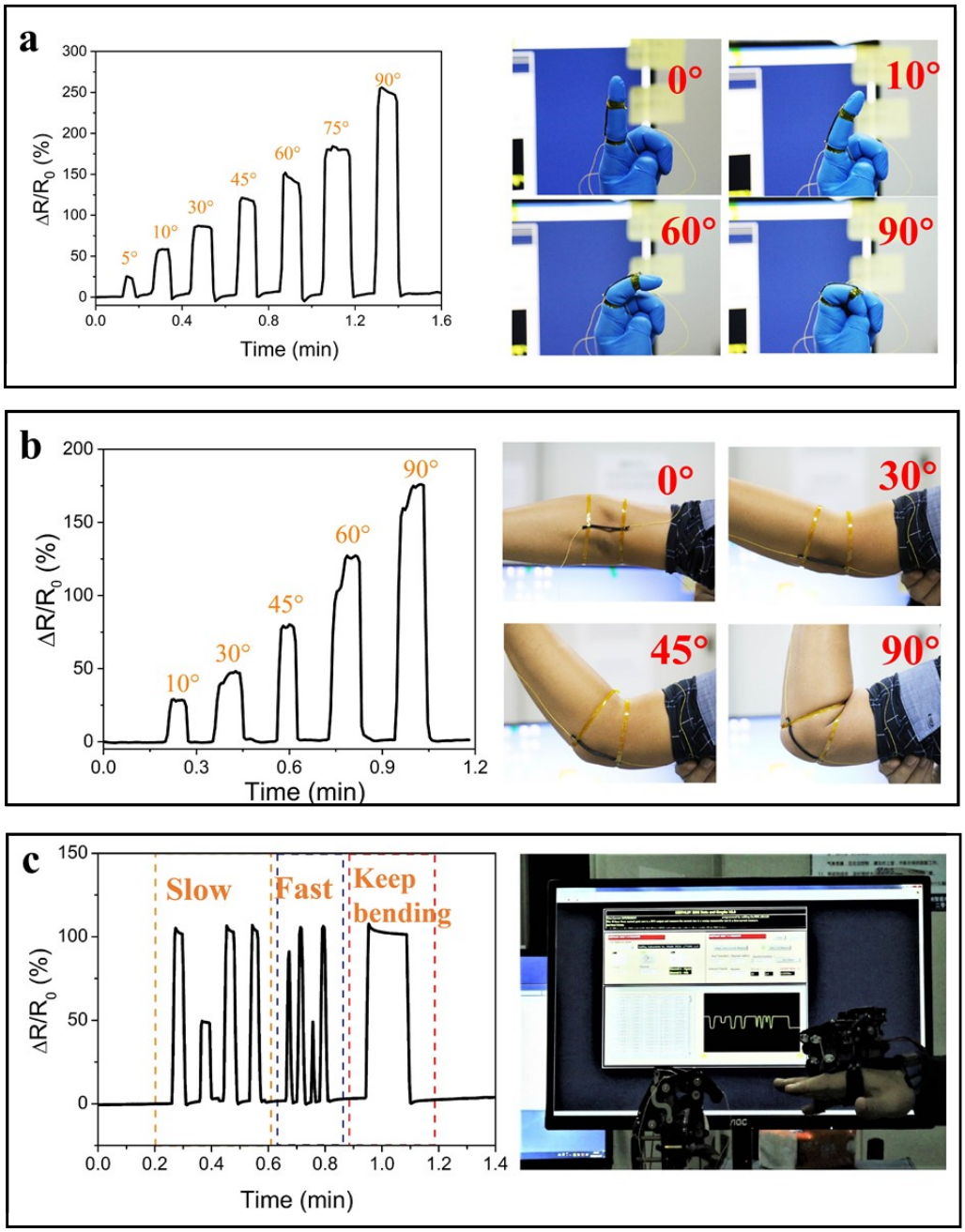

Fig. S7. The sensing performance of 5% Fe_3O_4/PEDOT: PSS/PVA multifunction hydrogels work as Figure (a) and elbow joint (b). c) The hydrogel sensor assembled on the mechanical finger to monitor the motion by the manipulator in real-time.

Video S1 and S2 show the self-recovery performance of the 5% Fe_3O_4/PEDOT: PSS/PVA hydrogel after repeated stretching and compression for ten cycles.

Video S3 shows the monitoring of the manipulator using the hydrogel-based wearable sensor.

Video S4 shows that the hydrogel-based wearable sensor can control the toy car remotely by assembling into a smart glove.