Supplementary information

Heteronetwork organohydrogels with exceptional swelling-resistance and adaptive antifouling performance

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Supplementary Methods

X-ray photoelectron spectroscopy

The data of X-ray photoelectron spectroscopy were obtained with a SCALab220i-XL electron spectrometer (VG Scientific) by using 300 W MgKα radiation. The base pressure was about 3×10^{-9} mbar. The binding energies were referenced to the C1s line at 284.8 eV from adventitious carbon. The samples of PDMS, MN-OHG, DN-OHG (PDMA/PBMA-co-PLMA organohydrogel) and PDMA hydrogel were dried at ambient temperature.

Raman spectroscopy

Raman spectroscopy measurements were carried out on a Raman spectrometer (LabRAM HR Evolution; Horiba Scientific). The wavelength of the excitation laser was 532 nm. All the collected spectra were processed using cosmic ray removal, noise filtering, baseline correction and normalization techniques based on the software of Lapspec-6. The samples of hydrated MN-OHG, hydrated DN-OHG (PDMA/PBMA-co-PLMA organohydrogel) and PDMA hydrogel were all equilibrated in water before the measurements.

Method for thermogravimetric analyses (TGA)

TGA were carried out on a nitrogen atmosphere in a PerkinElmer Pyris 1 TGA analyzer with the freeze-dried samples (dry PDMA, PDMA/PBMA-co-PLMA organohydrogel and MN-OHG) using heating

rates of 10 °C/m in from 30°C to 600°C.

Polarity of Liquids	**Liquids**	**Y/N**
0.06	n-Hexane	Y
1.6	Tetrachloromethane	Y
2.4	Toluene	Y
3.4	Dichloromethane	Y
4.3	Isopropanol	Y
5.4	Acetone	Y
6.6	Methyl alcohol	Y
7.2	Dimethyl sulfoxide	Y
10.2	Water	Y

Table S1. The multi-network organohydrogels can optionally use liquids with **wide range of polarity** as dispersion medium.

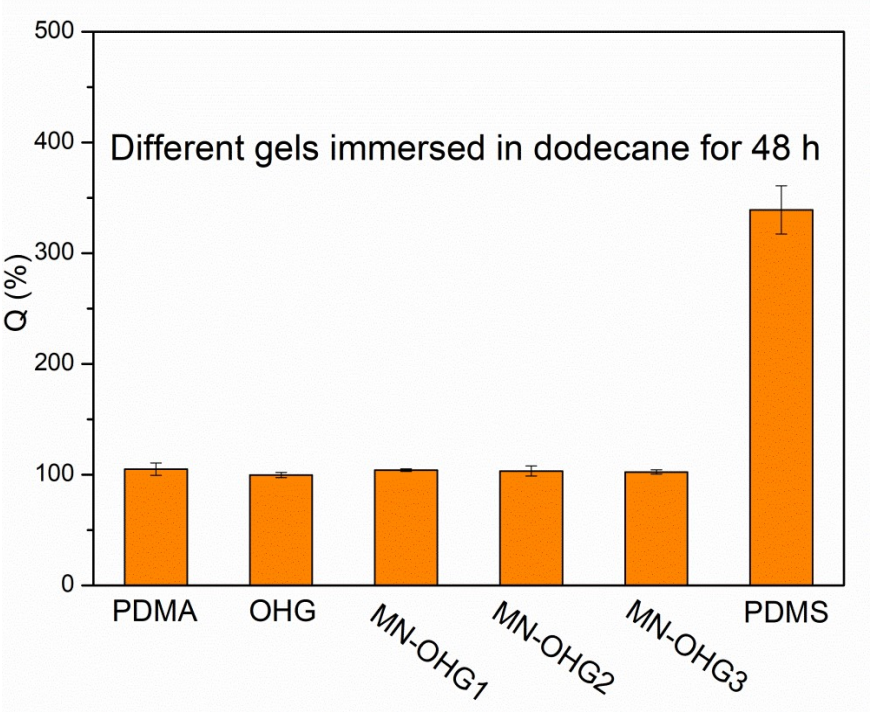

Figure S1. Statistical results of the swelling ratio (Q) of different gel samples equilibrated in dodecane for 48 h at room temperature (n=5, mean ± standard deviation). The weight ratios of PDEA: PBMA-co-PLMA: PDMS for samples MN-OHG-1, 2, and 3 are 7:9:1, 7: 9:2, 7:9:3, respectively.

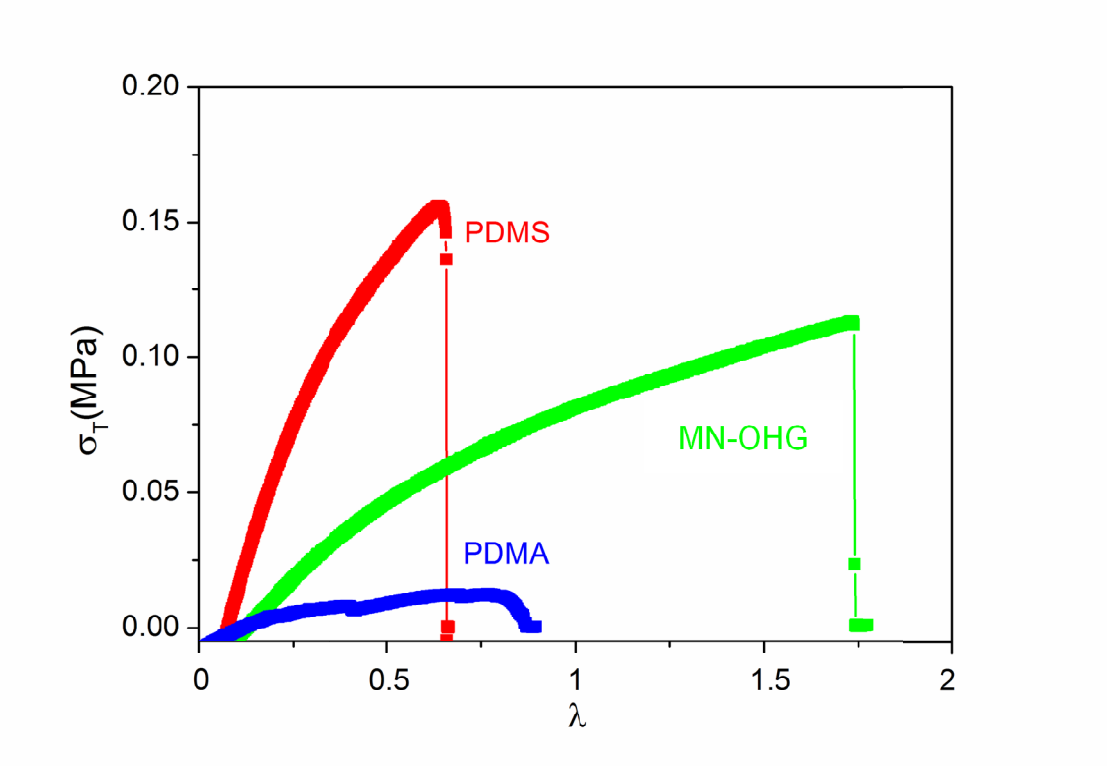

Figure S2. The tensile stress-strain curves of PDMA hydrogel, hydrated MN-OHG, and PDMS.

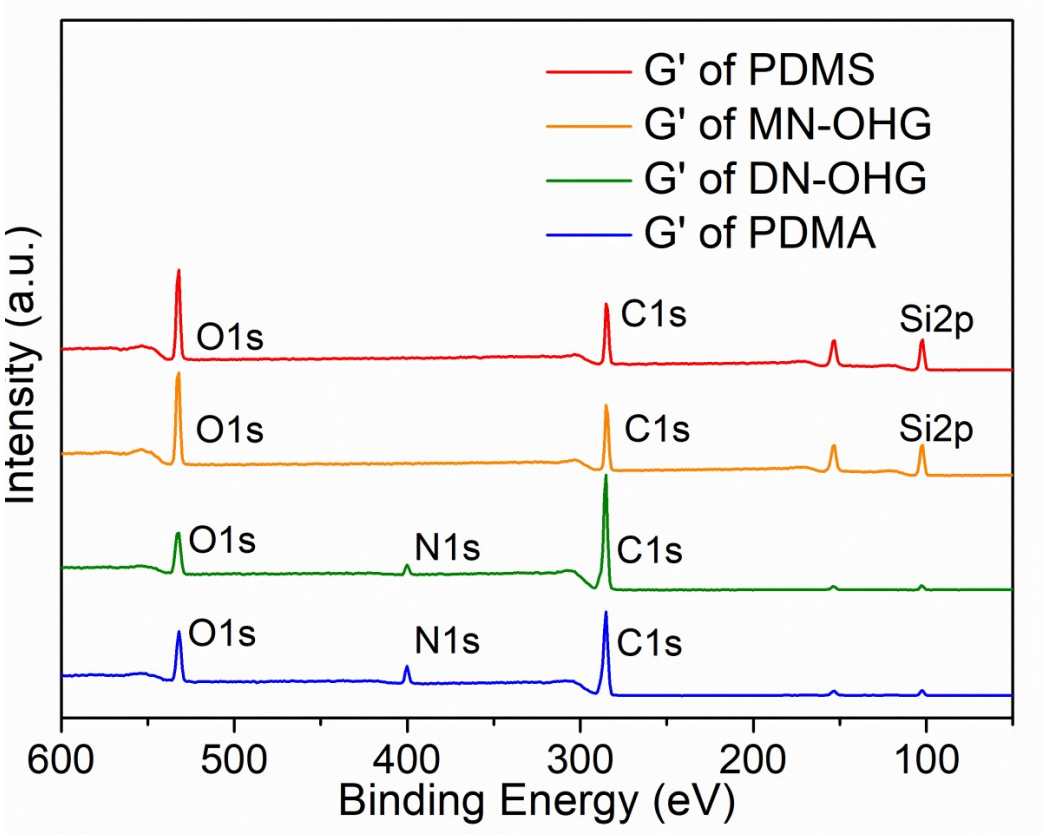

Figure S3. X ray photoelectron spectroscopy (XPS) images display the surface chemical composition of PDMS, MN-OHG, DN-OHG and PDMA hydrogel.

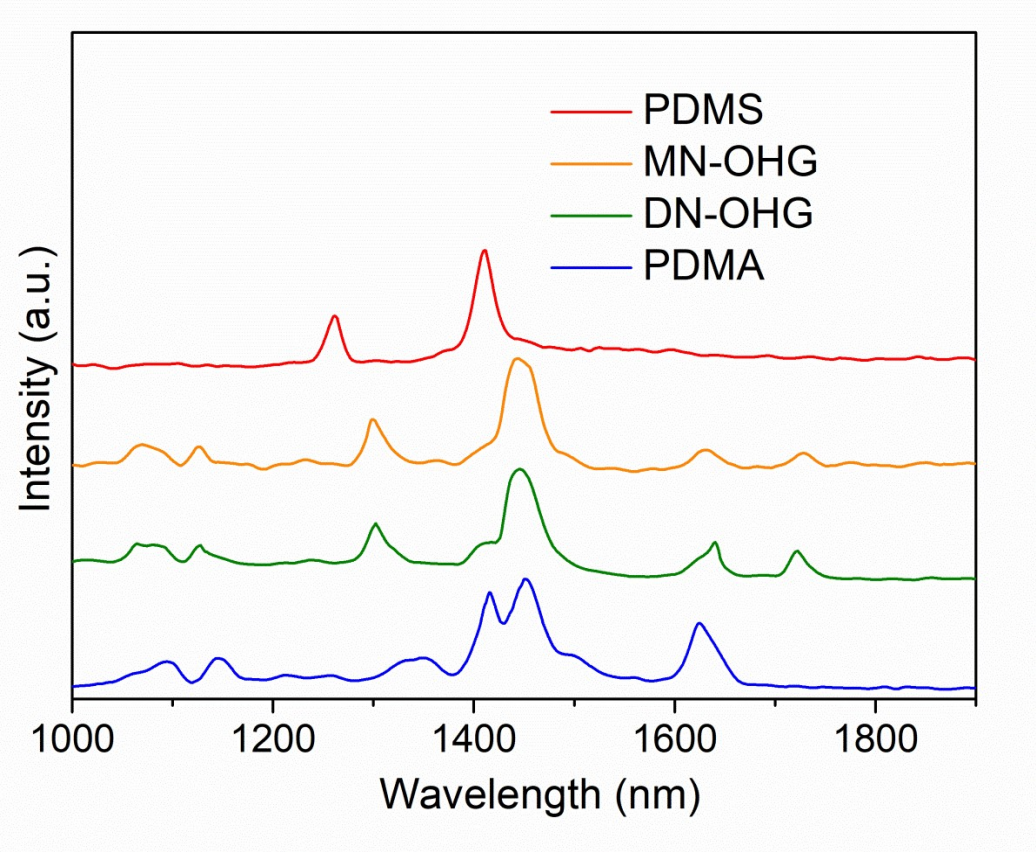

Figure S4. Raman spectra of PDMS, hydrated MN-OHG, hydrated DN-OHG and PDMA hydrogel.

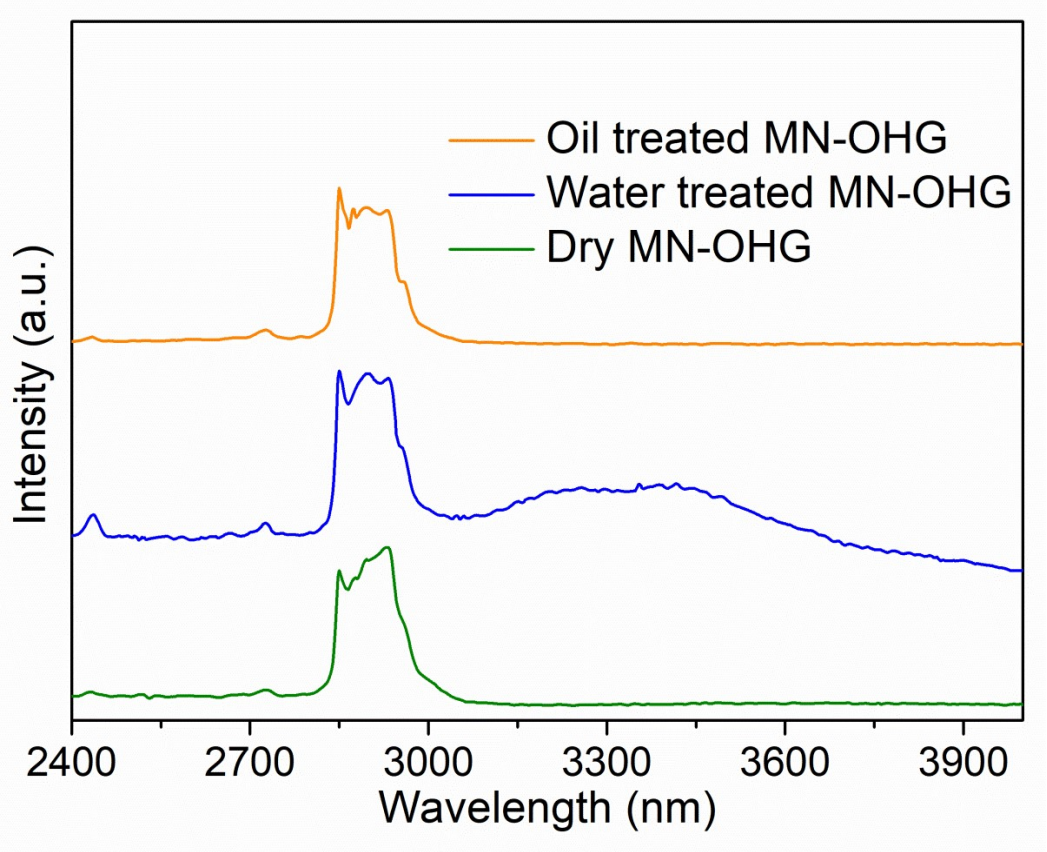

Figure S5. Raman information of individual MN-OHG equilibrated with pure water, oil (dodecane), and dry MN-OHG.

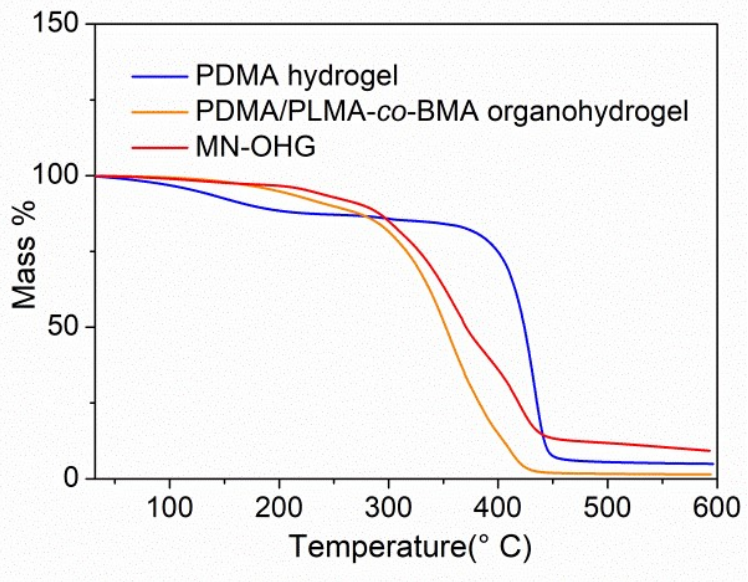

Figure S6. TGA data of PDMA hydrogel, PDMA/PBMA-co-PLMA organohydrogel and MN-OHG.

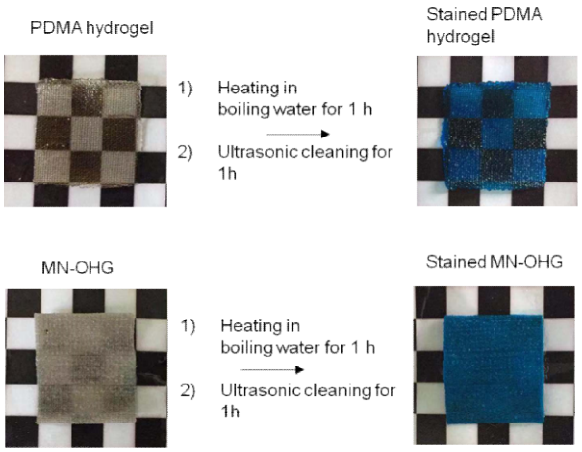

Figure S7. The images of hydrogel and MN-OHG modified copper meshes before and after treated by heating and ultrasonic cleaning.