

## Supporting Information

### **High Modulus Hydrogel Obtained from Hydrogen Bond Reconstruction and Application in Vibration Damper**

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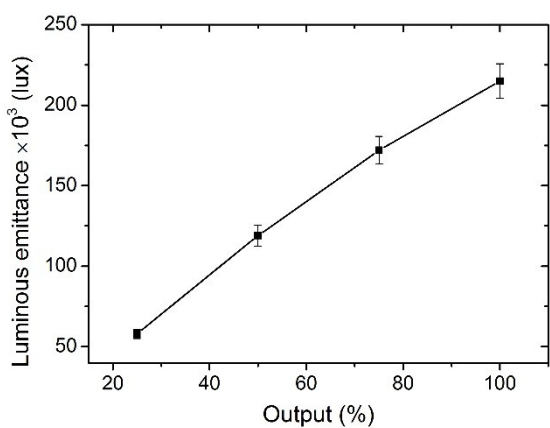


Figure S1 Relationship between output energy and luminous emittance.

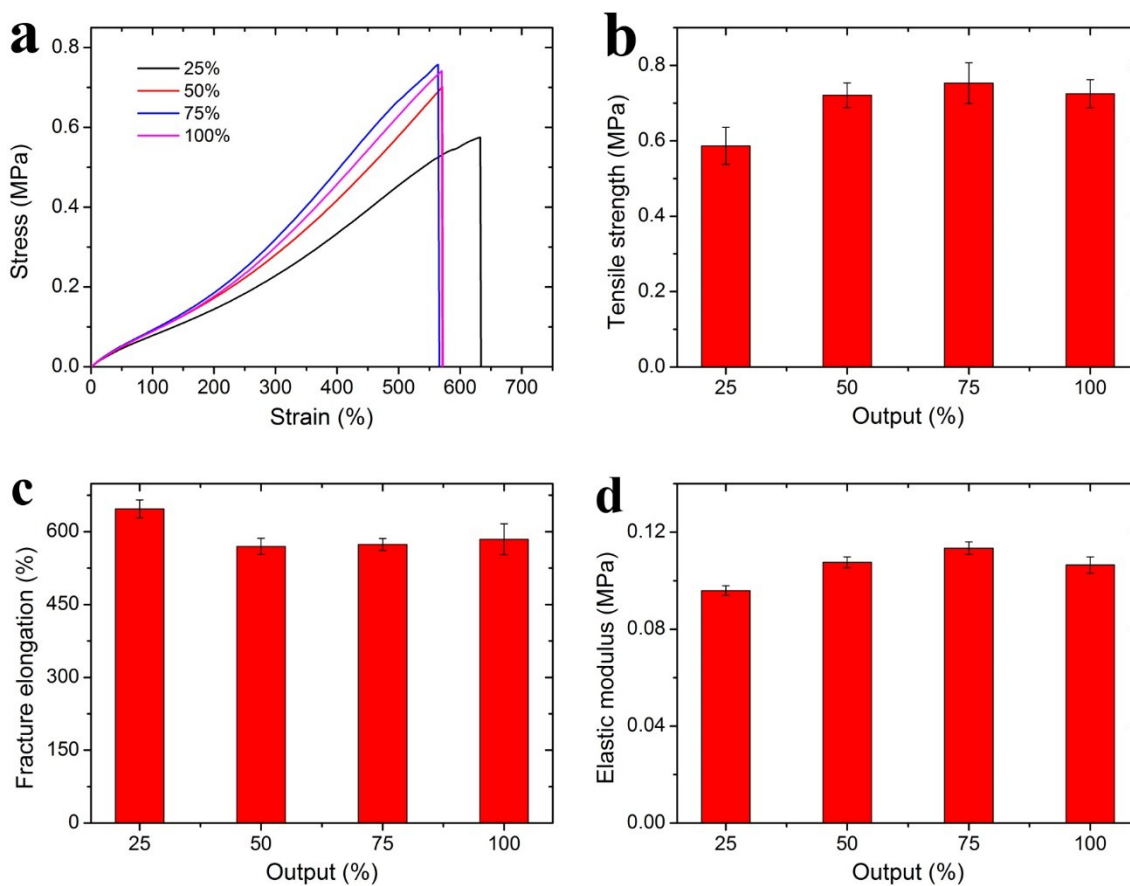


Figure S2 Effect of output energy on mechanical properties of Gel-1.0. a) stress-strain curves; b) tensile strength; c) fracture elongation; d) elastic modulus of Gel-1.0 prepared with various output energy.

Table S1 Mechanical properties of HM-Gel at different evaporation conditions.

Hydrogel	Tensile strength (MPa)		Fracture elongation (%)		Elastic modulus (MPa)	
	Air	Vacuum	Air	Vacuum	Air	Vacuum
D-Gel-0	1.21±0.01	1.26±0.06	159.7±4.12	119.3±6.7	0.751±0.028	0.987±0.075
D-Gel-0.1	1.39±0.01	1.70±0.06	153.4±1.1	144±2.2	0.903±0.010	1.138±0.097
D-Gel-0.5	1.55±0.06	1.74±0.04	150.2±10.8	129.0±2.7	1.017±0.141	1.267±0.049
D-Gel-1.0	1.50±0.12	1.73±0.05	122.7±4.9	107.6±3.5	1.222±0.056	1.450±0.046
D-Gel-1.5	1.06±0.13	1.35±0.12	107.8±12.2	91.4±5.6	0.886±0.169	1.257±0.015

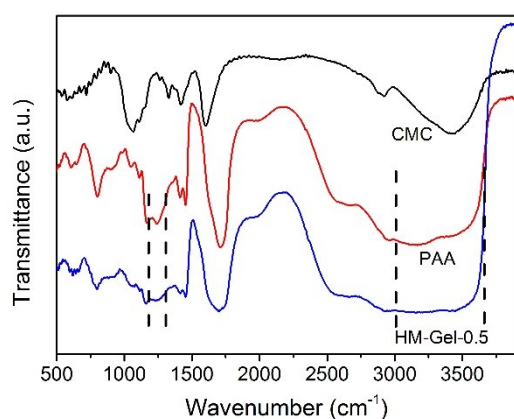


Figure S3 FT-IR spectra of CMC, PAA and HM-Gel-0.5.

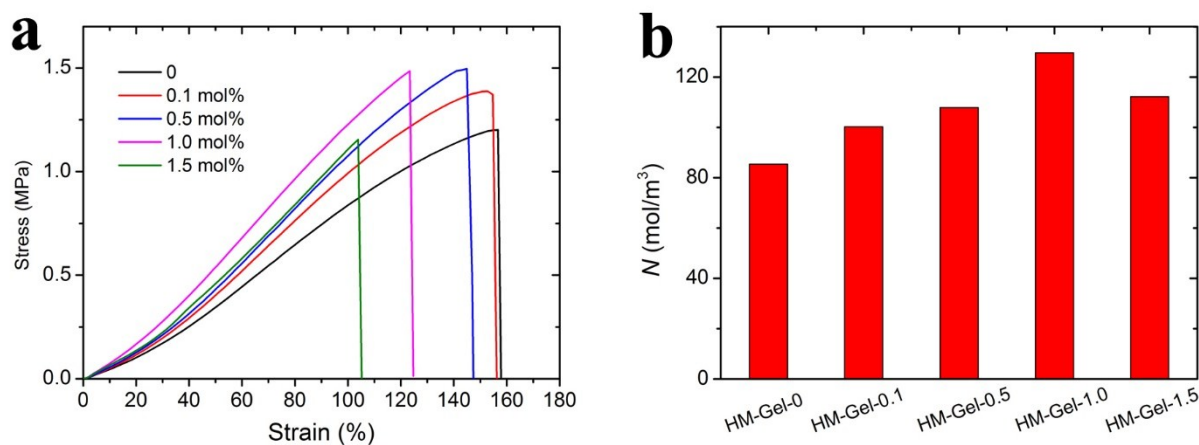


Figure S4 a) Stress-strain curves of HM-Gels (evaporation in air) with various  $\text{Al}^{3+}$  content. b)

Effective network chain density ( $N$ ) of HM-Gel with various  $\text{Al}^{3+}$  content.

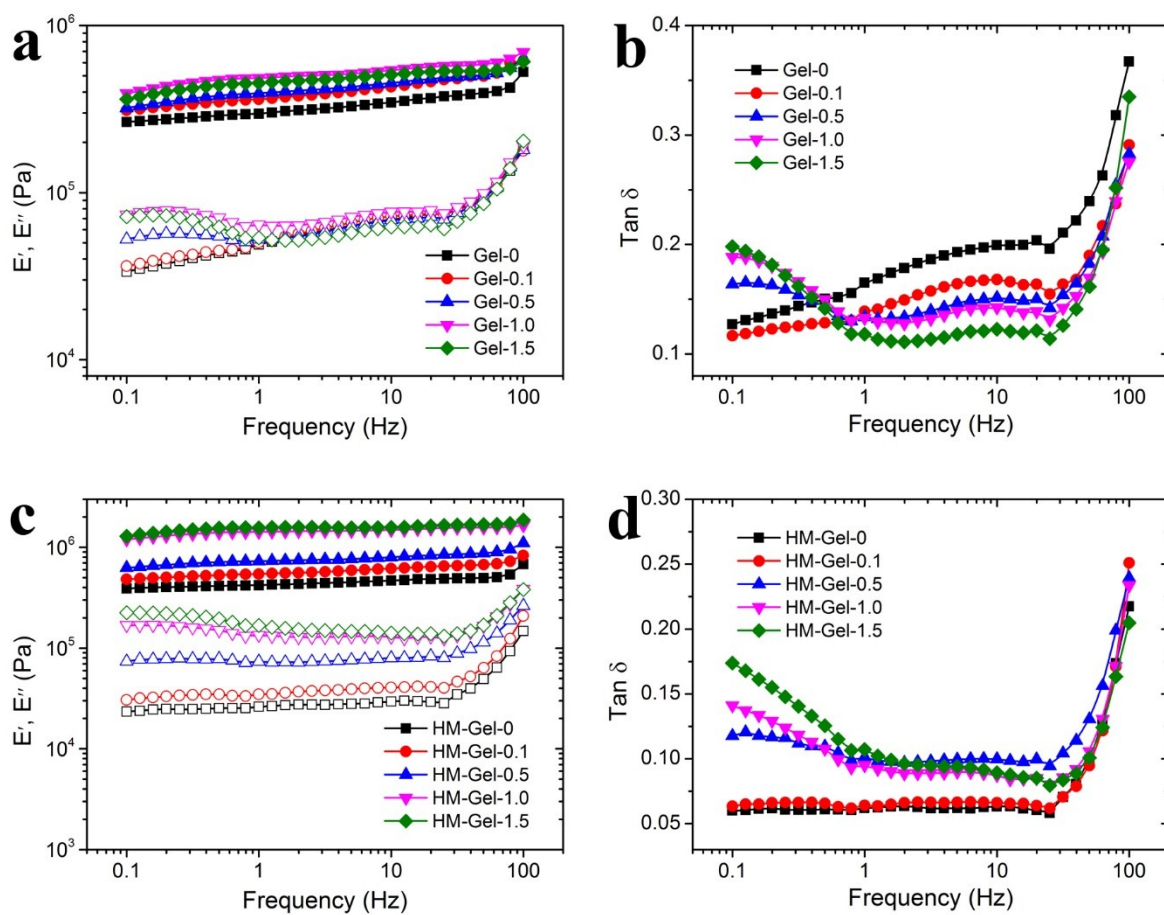


Figure S5 Dynamic mechanical analysis of Gel and HM-Gel. a) Storage modulus ( $E'$ ) and loss modulus ( $E''$ ); b)  $\text{Tan } \delta$  of Gel with various  $\text{Al}^{3+}$  content. c) Storage modulus ( $E'$ ) and loss modulus ( $E''$ ); d)  $\text{Tan } \delta$  of HM-Gel with various  $\text{Al}^{3+}$  content.

### Supplementary Movie S1

This movie showed the free vibration of the test tube mixer without any vibration damper. The test tube mixer was beaten violently and made a huge noise.

### Supplementary Movie S2

This movie shows the free vibration of the test tube mixer with HM-Gel as vibration damper. The test tube mixer was running smoothly and no noise was emitted.