

Supporting information

**The hydrogel sensor driven by sodium carboxymethyl starch with synergistic
enhancement of toughness and conductivity**

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Table S1. Recipes for P(Am-DMC)-CMS hydrogel samples

Hydrogels	CMS (g)	DMC (mL)	AAM (g)	MBA (g)	KPS (g)	TMEDA (μ L)	H ₂ O (mL)
P(Am-DMC)	0	1.8	4	0.002	0.04	40	20
P(Am-DMC)-1%CMS	0.2	1.8	4	0.002	0.04	40	20
P(Am-DMC)-2%CMS	0.4	1.8	4	0.002	0.04	40	20
P(Am-DMC)-3%CMS	0.6	1.8	4	0.002	0.04	40	20
P(Am-DMC)-4%CMS	0.8	1.8	4	0.002	0.04	40	20
P(Am-DMC)-5%CMS	1.0	1.8	4	0.002	0.04	40	20
P(Am-DMC)-6%CMS	1.2	1.8	4	0.002	0.04	40	20
P(Am-3%DMC)-5%CMS	1.0	0.6	4	0.002	0.04	40	20
P(Am-6%DMC)-5%CMS	1.0	1.2	4	0.002	0.04	40	20
P(Am-9%DMC)-5%CMS	1.0	1.8	4	0.002	0.04	40	20
P(Am-12%DMC)-5%CMS	1.0	2.4	4	0.002	0.04	40	20

Table S2. Comparison of the hydrogel with the other hydrogels in the available literature

Hydrogel	Stress (kPa)	Strain (%)	Conductivity (S m ⁻¹)	Sensitivity (GF)	References
PDA-PPy-PAM hydrogel	130	2000	12 (sodium hydroxide and ferric chloride)	-	34
PVA-CNF Organohydrogels	2100	400	3.2 (sodium chloride)	1.5	35
HPC/PVA Hydrogel	1300	975	2.6 (sodium chloride)	-	36
PVA/PAMAA/Gly/NaCl organohydrogels	345	1002	1.4 (sodium chloride)	8.3	37
Amy/(PAAm-AAc) hydrogels	100	1100	- (sodium chloride)	6.93	38
HPMC-g-AN/ AM0.6-ZnCl ₂ -25% hydrogel	160	1730	1.54 (Zinc chloride)	-	39
Gel-C5 hydrogel	41	436	- (carbon nanotubes)	5.9	40
P(Am-DMC)-CMS hydrogel	217	411	0.015 (CMS and DMC)	5.73	This work

-represented that the specific values were not mentioned in the paper.

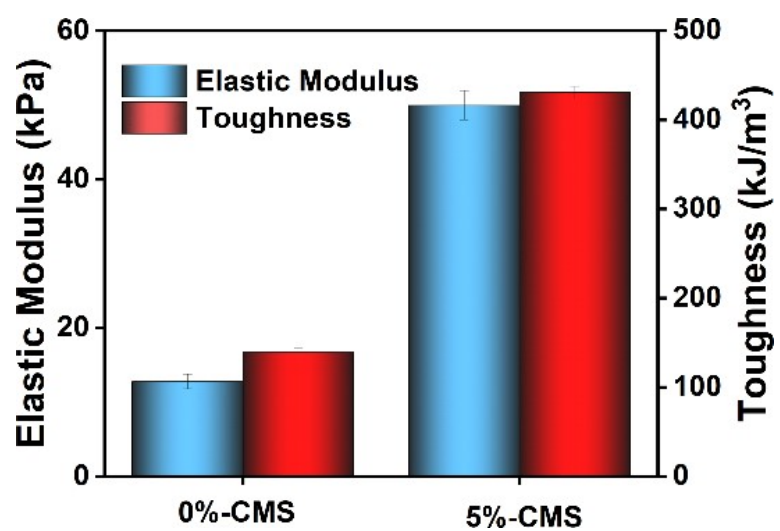


Fig.S1. The toughness and elastic modulus curves of P(Am-DMC) and P(Am-DMC)-CMS hydrogels.

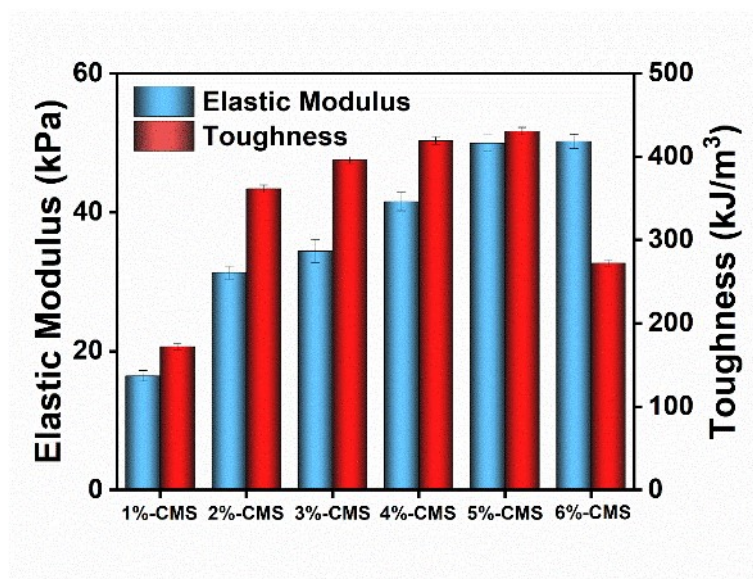


Fig.S2. The elastic modulus and toughness of P(Am-DMC)-CMS hydrogel with different content of CMS (1%, 2%, 3%, 4%, 5%, and 6%).

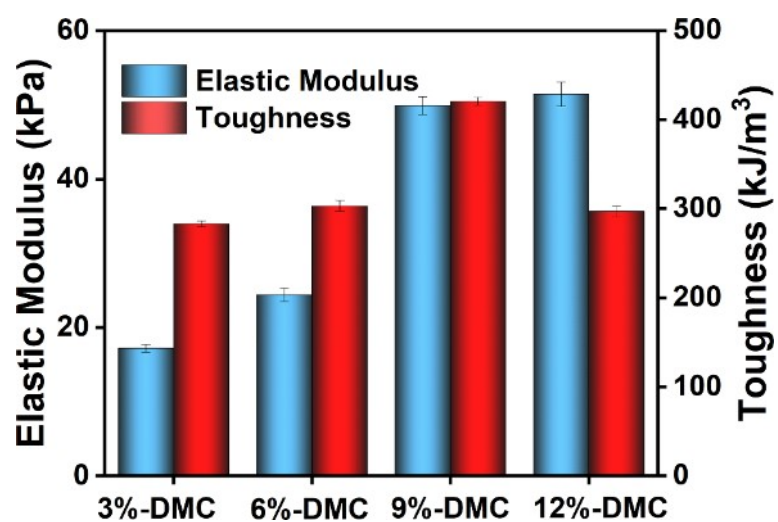


Fig.S3. The elastic modulus and toughness of P(Am-DMC)-CMS hydrogel with various content of DMC (3%, 6%, 9%, and 12%).

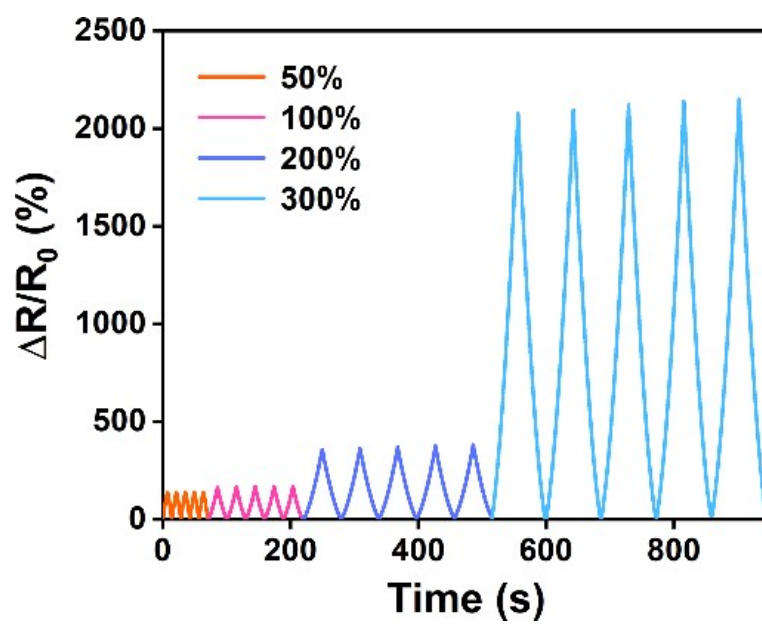


Fig.S4. Relative resistance variation of the P(Am-DMC)-CMS hydrogel under diverse stretching strain.