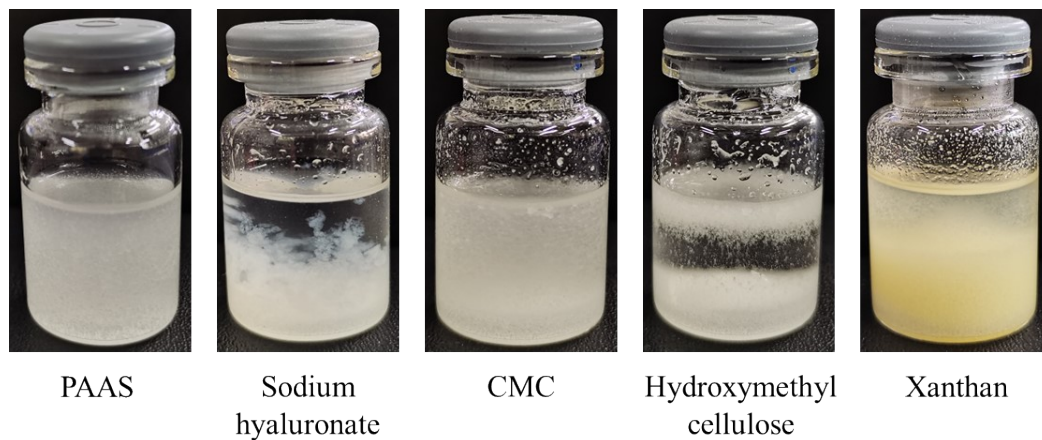
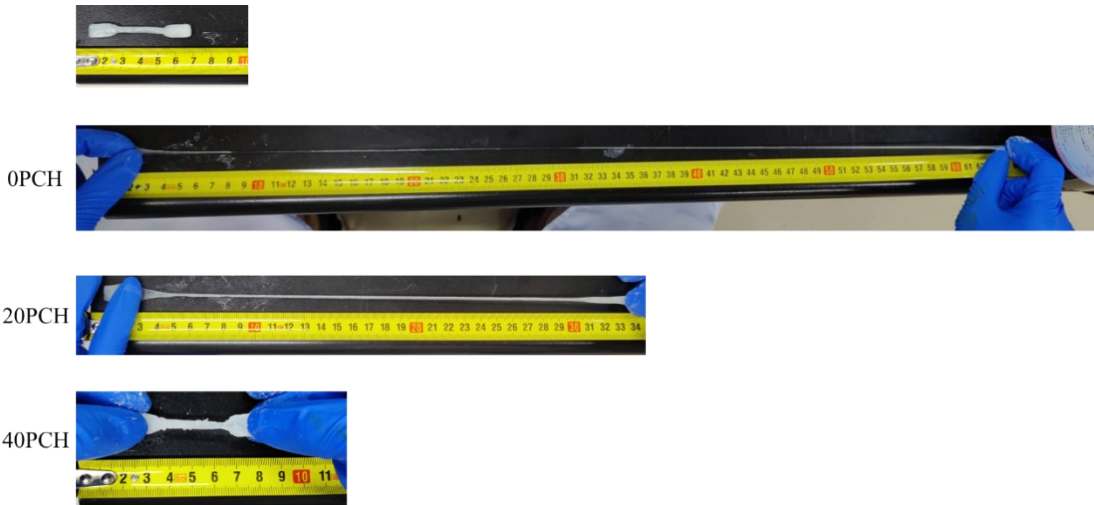


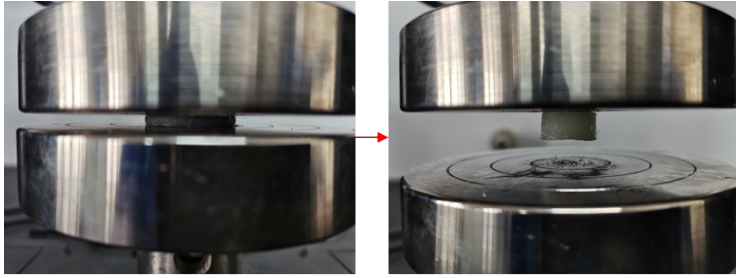
**Supplementary Information**



**Fig.s1, The influence of different thickeners on sodium sulfate solution**



**Fig.s2, Stretching ability of different PCH**



20PCH

**Fig.s3, 20PCH quickly recovers after 80% compression**

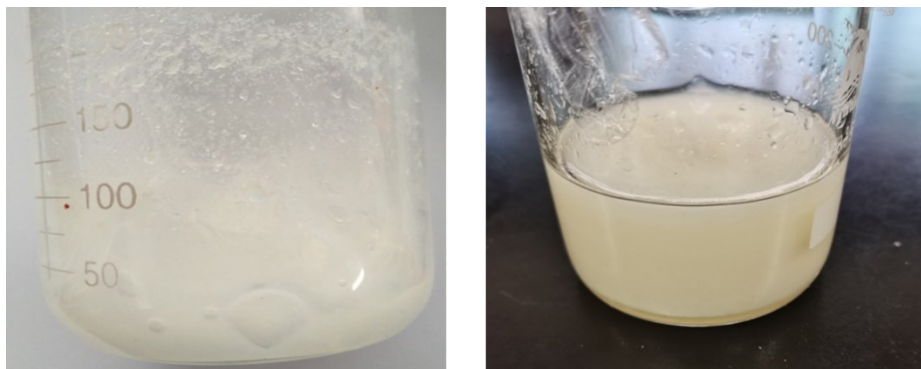


30PCH

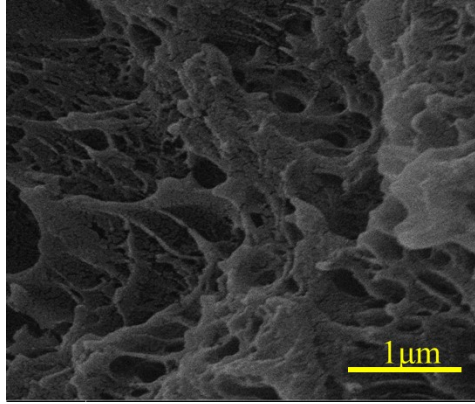


CaCl<sub>2</sub>PCH

**Fig.s4, 30PCH slowly recovers after 80% compression, while 35-40PCH and calcium chloride PCH are broken**



**Fig.s5, Severe phase separation phenomenon of 40PCH**



**Fig.s6,The denser and smaller pore size of hydrogel observed in PCH with high monomer content**

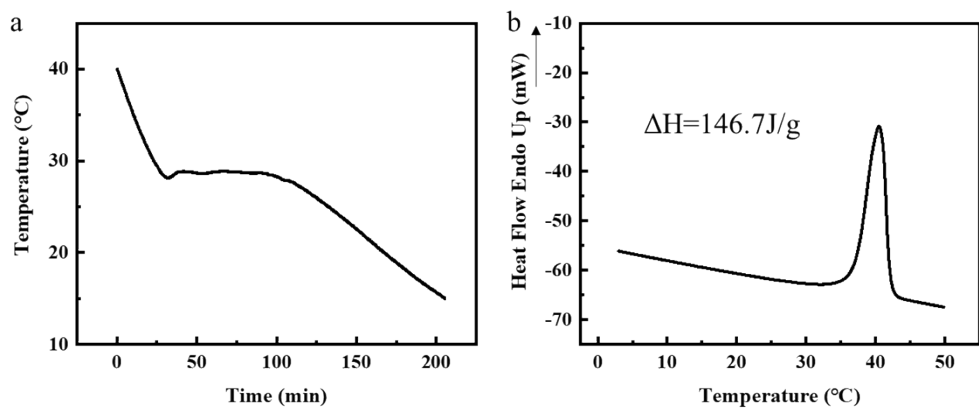
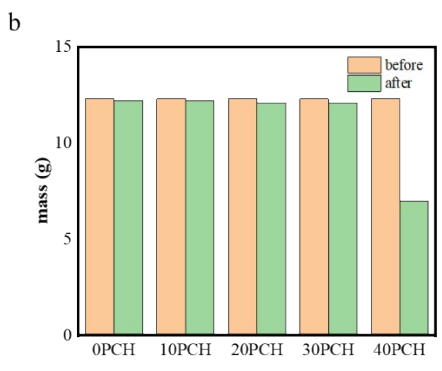
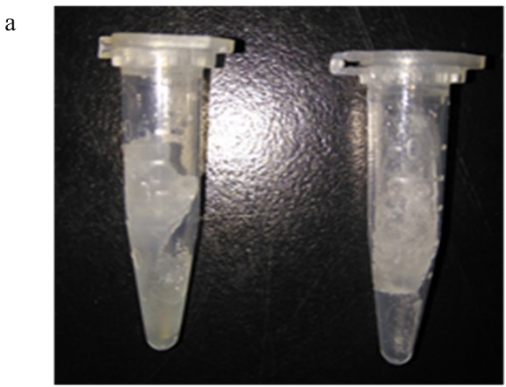
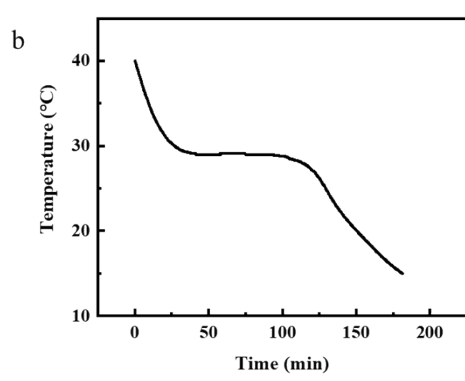
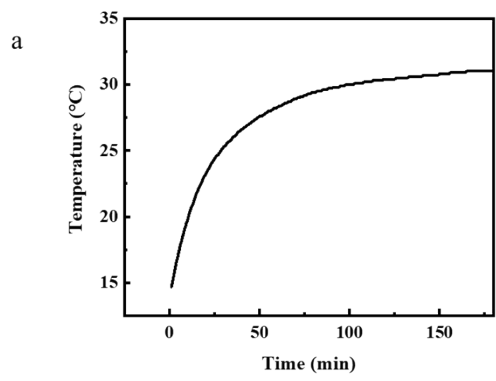


Fig.s7, 30PCH after 500 cycles of heating and cooling. a Cooling curve. b DSC curve.



**Fig.s8, The PCH undergoes 500 phase change cycles. a. Left (0 times) Right (500 times), b. Mass change.**



**Fig.s9, a Wearing test temperature curve of PCH in 33°C outdoor environment. b Cooling curve of 30PCH.**