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## **Supporting Information**

## Nonswellable gradient hydrogel with tunable mechanical

## properties



Figure S1 Water loss of the whole gel and the divided gel after three days in the air.

the picture above is IPAM NC<sub>9</sub>, and the below is IPAM NC<sub>11</sub>



Figure S2 FTIR of the different parts of PAM NC hydrogel and IPAM NC<sub>8</sub> hydrogel



Figure S3 EDS of the different parts of IPAM  $NC_8$  hydrogel ; a, outside; b, inside



Figure S4 SEM of the cross section of IPAM NC hydrogels. a) IPAM NC<sub>6</sub>; b) IPAM

NC<sub>8</sub>; c) IPAM NC<sub>9</sub>; d) IPAM NC<sub>11</sub>



Figure S5 a) The phenomenon of rapid phase separation in water, b) SEM of fresh cut cross-section and c) Polarized optical microscopy images of fresh cut cross-section of IPAM  $NC_8$  hydrogel



Figure S6 Swelling ratio of IPAM $_{30}$  NC hydrogels in 0.9 wt% NaCl solution



Figure S7 Compression test of IPAM<sub>30</sub> NC hydrogels at different reaction time

	Amide index	
	R1	R2
IPAM <sub>30</sub> NC <sub>12</sub>	0.62	0.30
IPAM <sub>30</sub> NC <sub>13</sub>	0.61	0.30
IPAM <sub>30</sub> NC <sub>14</sub>	0.63	0.28
IPAM <sub>30</sub> NC <sub>19</sub>	0.71	0.32
IPAM <sub>30</sub> NC <sub>21</sub>	0.68	0.32

Table S1 Degree of imidization of  $IPAM_{30}$  NC hydrogels

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Table S2 Water contents of IPAM<sub>30</sub> NC hydrogels at different reaction time

Sample	Water content	
	(%)	
IPAM <sub>30</sub> NC <sub>12</sub>	55	
IPAM <sub>30</sub> NC <sub>13</sub>	55	
$IPAM_{30}NC_{14}$	53	
IPAM <sub>30</sub> NC <sub>19</sub>	45	
IPAM <sub>30</sub> NC <sub>21</sub>	39	