

# **Thermostable and Redispersible Cellulose Nanocrystals with Thixotropic Gelation Behavior by a Facile Desulfation Process**

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## **Supporting information content**

Number of pages: 5

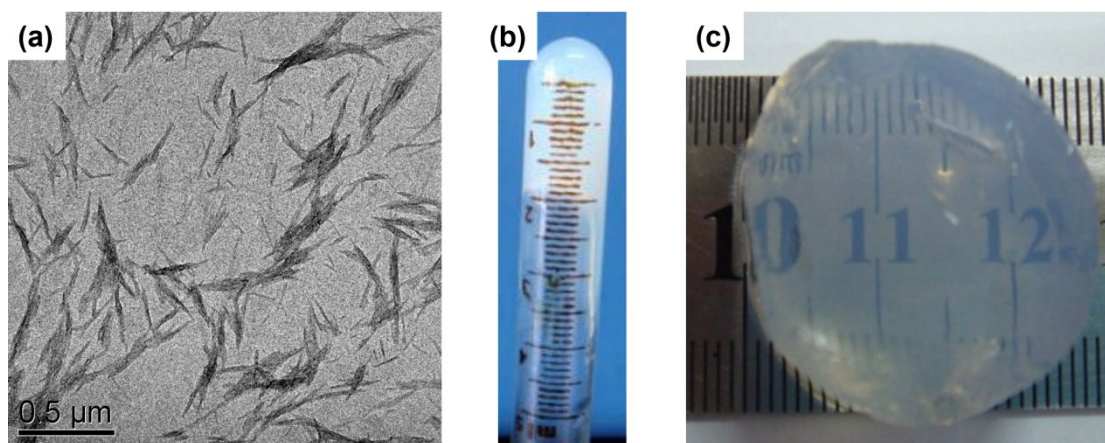
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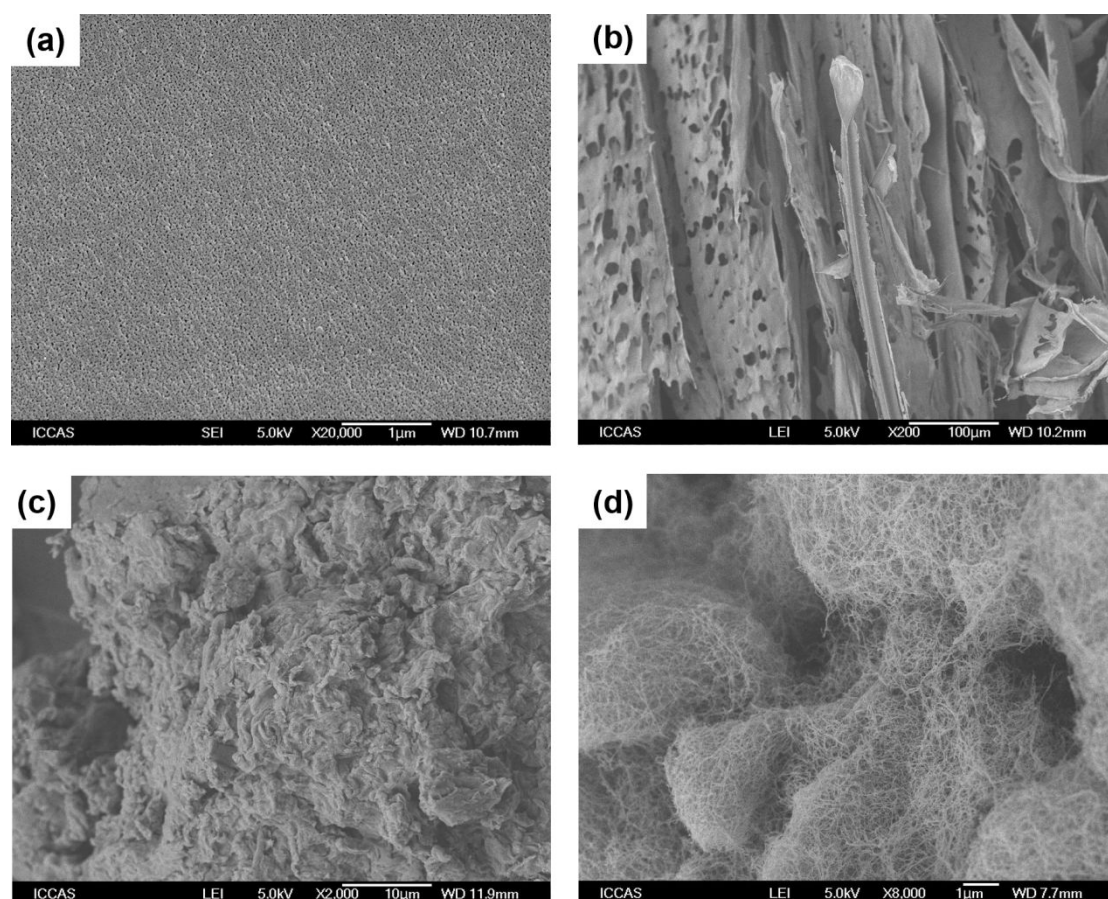
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**Figure S1.** (a) TEM image of pristine CNC. (b) Photograph of CNC hydrogel obtained by adding four drops of concentrated hydrochloric acid. (c) Photograph of transparent CNC hydrogel obtained by dialyzing with HCl aqueous solution (0.05 M).

**Table S1.** Crystallinity index and crystalline dimension of CNC powders.

Samples	Crystallinity index (%)	Crystalline dimension by (200) plane (nm)
CNC-a	73.4	7.0
CNC-b	74.8	8.0
CNC-c	78.6	8.0
CNC-d	74.5	7.0



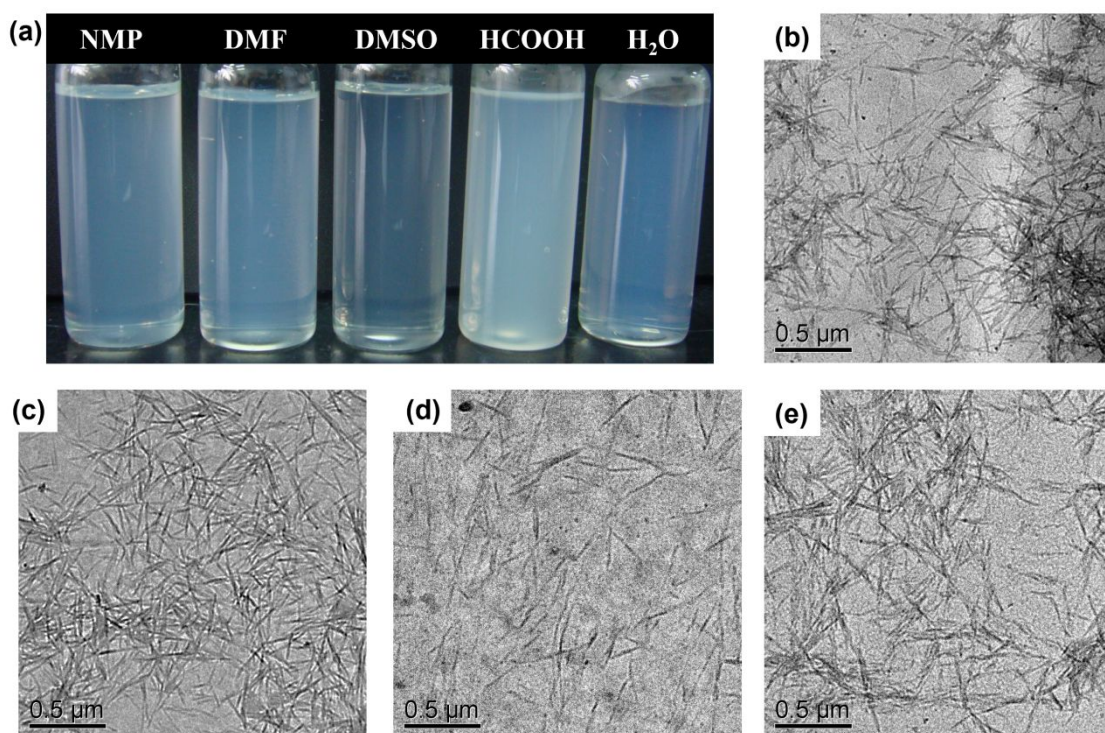
**Figure S2.** SEM images of (a) CNC-a powder, (b) CNC-b powder, (c) CNC-c powder and (d) CNC-d powder.

**Table S2.** The onset decomposition temperature ( $T_{\text{onset}}$ ), maximum decomposition temperature ( $T_{\text{max}}$ ) and maximum weight loss rate ( $\text{WLR}_{\text{max}}$ ) of CNC powders and MCC under nitrogen atmosphere with a heating rate of 20 °C/min.

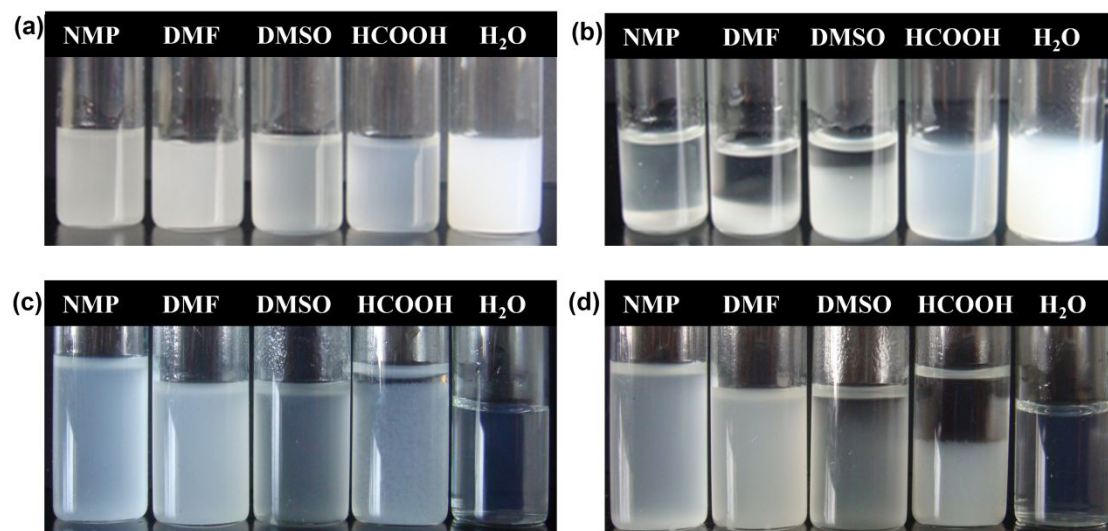
Samples	$T_{\text{onset}}$ (°C)	Process 1		Process 2		Char at 500 °C (%)
		$T_{\text{max}}$ (°C)	$\text{WLR}_{\text{max}}$ (%/°C)	$T_{\text{max}}$ (°C)	$\text{WLR}_{\text{max}}$ (%/°C)	
CNC-a	192	233	0.32	362	0.10	28.9
CNC-b	234	283	0.37	356	0.11	26.3
CNC-c	273	289	0.38	333	0.47	26.4
CNC-d	319	N/A	N/A	351	1.53	9.2
MCC	325	N/A	N/A	349	1.26	5.0

**Table S3.** The onset decomposition temperature ( $T_{\text{onset}}$ ), maximum decomposition temperature ( $T_{\text{max}}$ ) and maximum weight loss rate ( $\text{WLR}_{\text{max}}$ ) of CNC powders and MCC under air atmosphere with a heating rate of 20 °C/min.

Samples	$T_{\text{onset}}$ (°C)	Process 1		Process 2		Char at 600 °C (%)
		$T_{\text{max}}$ (°C)	$\text{WLR}_{\text{max}}$ (%/°C)	$T_{\text{max}}$ (°C)	$\text{WLR}_{\text{max}}$ (%/°C)	
CNC-a	193	230	0.37	327	0.18	0
CNC-b	230	266	0.42	326	0.22	0
CNC-c	272	291	0.37	324	0.44	0
CNC-d	306	N/A	N/A	323	1.10	0
MCC	318	N/A	N/A	335	1.44	0



**Figure S3.** (a) Photograph of CNC-d re-dispersed in various solvents (3 mg/mL) by a 20 min ultrasonic treatment. (b) TEM image of CNC-d/NMP solution. (c) TEM image of CNC-d/DMF solution. (d) TEM image of CNC-d/DMSO solution. (e) TEM image of CNC-d/HCOOH solution.



**Figure S4** (a) Photograph of CNC-a re-dispersed in various solvents (3 mg/mL) by 6 h ultrasonic treatment. (b) Photograph of CNC-a dispersions stored for 24 h. (c) Photograph of direct-drying CNC re-dispersed in various solvents (3 mg/mL) by 6 h ultrasonic treatment. The direct-drying CNC was obtained by drying CNCs hydrogel at room temperature and 1 atmosphere. (d) Photograph of direct-drying CNC dispersions stored for 24 h.