Supporting Information

Electrospun nanosized cellulose fibers using ionic liquids at room temperature

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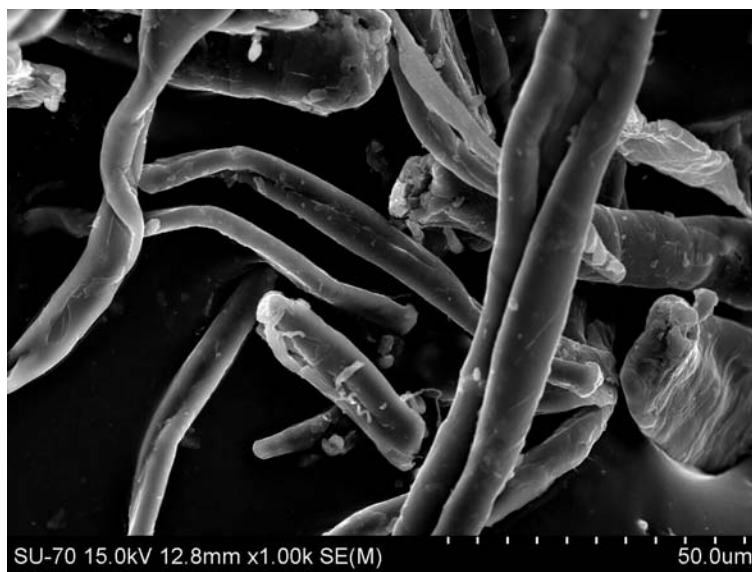
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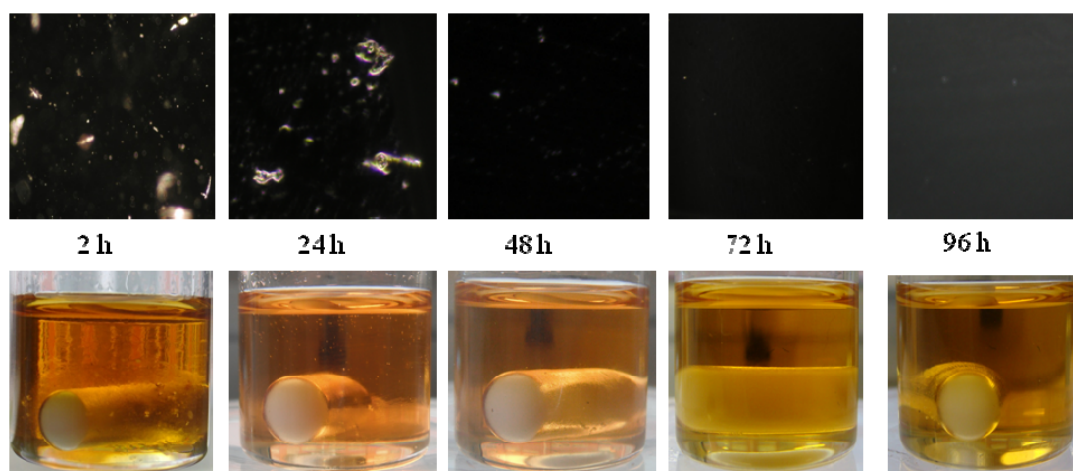
Results

Fig. S1 SEM image of the raw cellulose.

Fig. S2 POM images and macroscopic aspect of the cellulose dissolution status at 8 wt % in [C$_2$mim][CH$_3$CO$_2$] after 2 h, 24 h, 48 h, 72 h, and 96 h of dissolution, at 298 K.
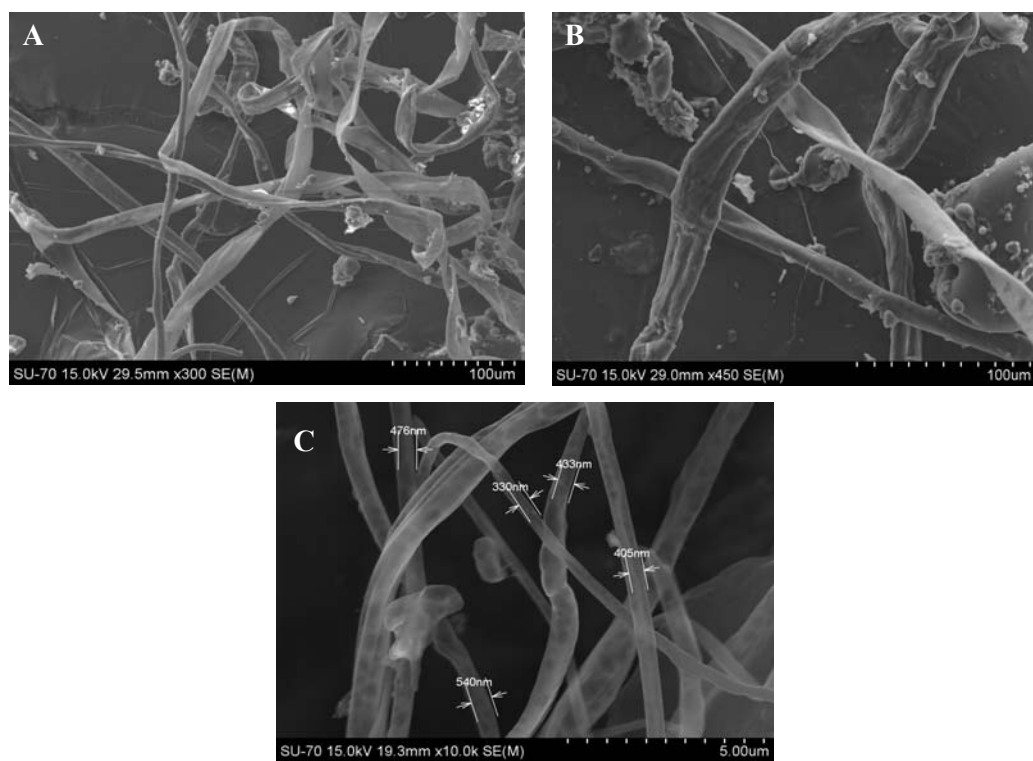
Fig. S3 SEM images of electrospun fibers with dissolution times of 24 h (**A**), 48 h (**B**), and 72 h (**C**) for 8 wt % of cellulose in [C$_2$mim][CH$_3$CO$_2$].

Table S1 Maximum water content in the ionic liquids samples

Ionic Liquid	Water Content (wt %)
$[C_2mim][CH_3CO_2]$	0.270
$[C_{10}mim]Cl$	0.264
$[C_4mim][BF_4]$	0.056
$[C_4mim][NTf_2]$	0.047
$[C_8mim][BF_4]$	0.045
$[C_8mim][PF_6]$	0.497
$[C_8mim][NTf_2]$	0.159

Table S2 Surface tension values for pure ionic liquids at 298.2 K

Ionic liquid	σ (this work) / $(mN·m^{-1})$	σ (literature)[1]/ $(mN·m^{-1})$	$\Delta\sigma$ %
$[C_4mim][BF_4]$	44.49 ± 0.03	44.50	-0.017
$[C_4mim][NTf_2]$	33.01 ± 0.01	33.33	-0.969
$[C_8mim][BF_4]$	33.43 ± 0.05	33.44	-0.037
$[C_8mim][PF_6]$	34.92 ± 0.03	34.95	-0.080
$[C_8mim][NTf_2]$	31.53 ± 0.04	31.59	-0.187

[1](a) M. G. Freire, P. J. Carvalho, A. M. Fernandes, I. M. Marrucho, A. J. Queimada and J. A. P. Coutinho, J. *Colloid Interf. Sci.*, 2007, **314**, 621-630. (b) P. J. Carvalho, M. G. Freire, I. M. Marrucho, A. J. Queimada and J. A. P. Coutinho, *J. Chem. Eng. Data*, 2008, **53**, 1346-1350.

Table S3 Density values for $[C_2mim][CH_3CO_2]/[C_{10}mim]Cl$ mixtures at 298.15 K

$x_{[C2mim][CH3CO2]}$	$x_{[C10mim]Cl}$	$\rho / (g \cdot cm^{-3})$
1.0000	0.0000	1.105
0.9905	0.0095	1.104
0.9477	0.0523	1.098
0.8979	0.1021	1.091
0.6853	0.3147	1.064
0.5984	0.4016	1.053
0.5000	0.5000	1.041
0.0000	1.0000	0.9821

Table S4 Surface tension values for $[C_2mim][CH_3CO_2]/[C_{10}mim]Cl$ mixtures at 298.2 K

$x_{[C2mim][CH3CO2]}$	$x_{[C10mim]Cl}$	$\sigma / (mN \cdot m^{-1})$
1.0000	0.0000	45.24 ± 0.03
0.9905	0.0095	42.93 ± 0.05
0.9477	0.0523	36.30 ± 0.09
0.8979	0.1021	32.49 ± 0.04
0.6853	0.3147	29.90 ± 0.02
0.5984	0.4016	29.64 ± 0.09
0.5000	0.5000	29.32 ± 0.02
0.3179	0.6821	28.81 ± 0.07

Table S5 Viscosity values for $[C_2mim][CH_3CO_2]/[C_{10}mim]Cl$ mixtures at a shear rate of 2 s^{-1} at 298.2 K

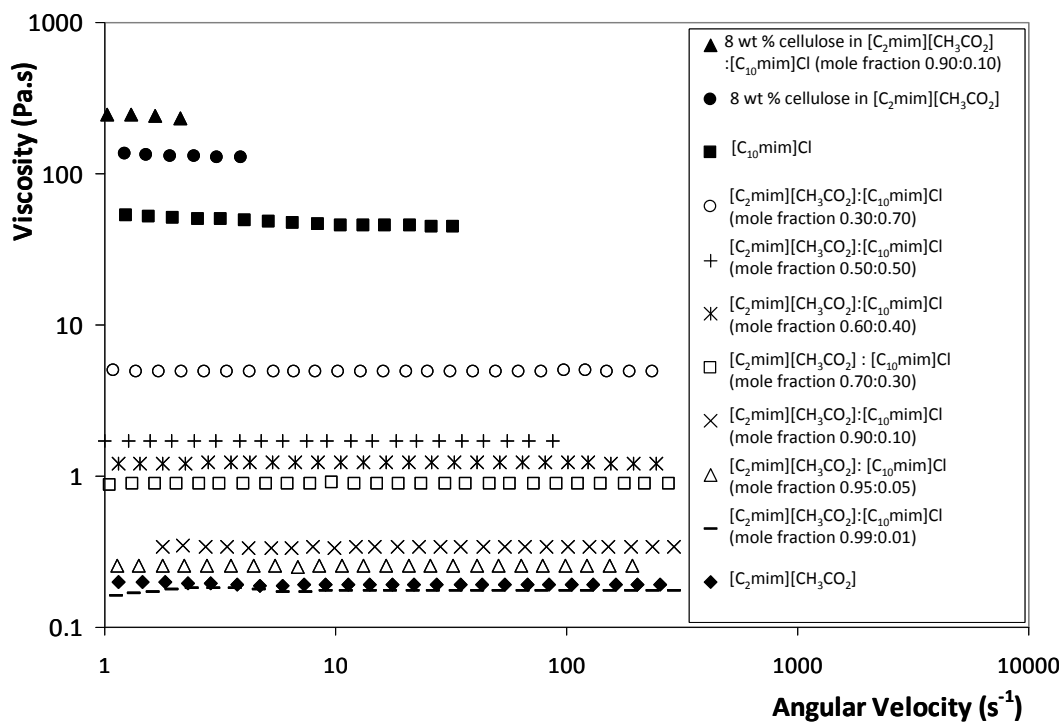| $x_{[C2mim][CH3CO2]}$	$x_{[C10mim]Cl}$	Shear rate / (s^{-1})	$\eta / (Pa \cdot s)$
1.0000	0.0000	1.822	0.199
0.9905	0.0095	2.387	0.180
0.9477	0.0523	2.223	0.254
0.8979	0.1021	2.192	0.345
0.6853	0.3147	2.396	0.899
0.5984	0.4016	2.244	1.223
0.5000	0.5000	2.450	1.706
0.3179	0.6821	2.164	4.947
0.0000	1.0000	2.526	50.410

Fig. S4 Viscosity as a function of shear rate for pure ionic liquids, binary mixtures of ionic liquids, and ionic liquids containing 8 wt % of cellulose, at 298.2 K.
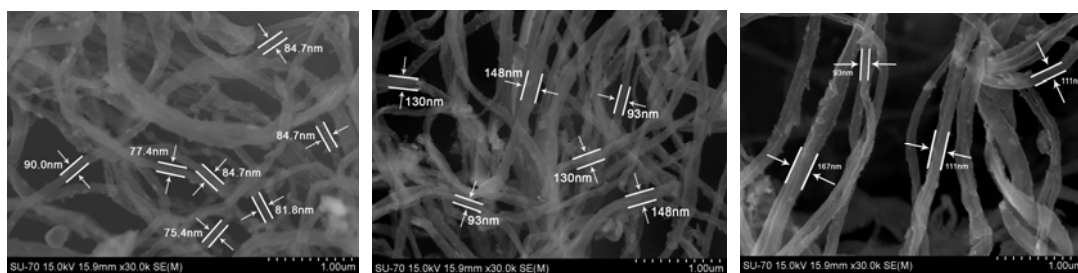
Fig. S5 SEM images of electrospun cellulose fibers from a 8 wt % polymer solution in [C$_2$mim][CH$_3$CO$_2$]/[C$_{10}$mim]Cl (mole fraction ratio 0.90:0.10) after 72 h of homogenization.
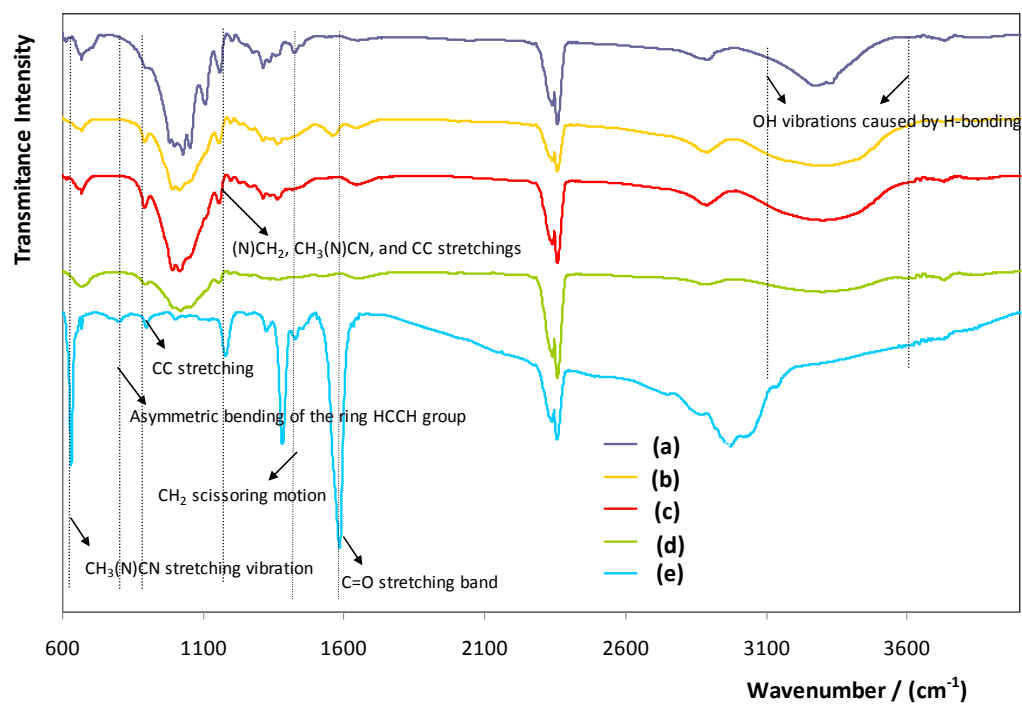
Fig. S6 FTIR spectra of raw cellulose **(a)**, regenerated casting film **(b)**, electrospun cellulose fibers from the neat $[C_2mim][CH_3CO_2]$ **(c)**, electrospun cellulose fibers from the $[C_2mim][CH_3CO_2]/[C_{10}mim]Cl$ mixture **(d)**, and pure $[C_2mim][CH_3CO_2]$ **(e)**.
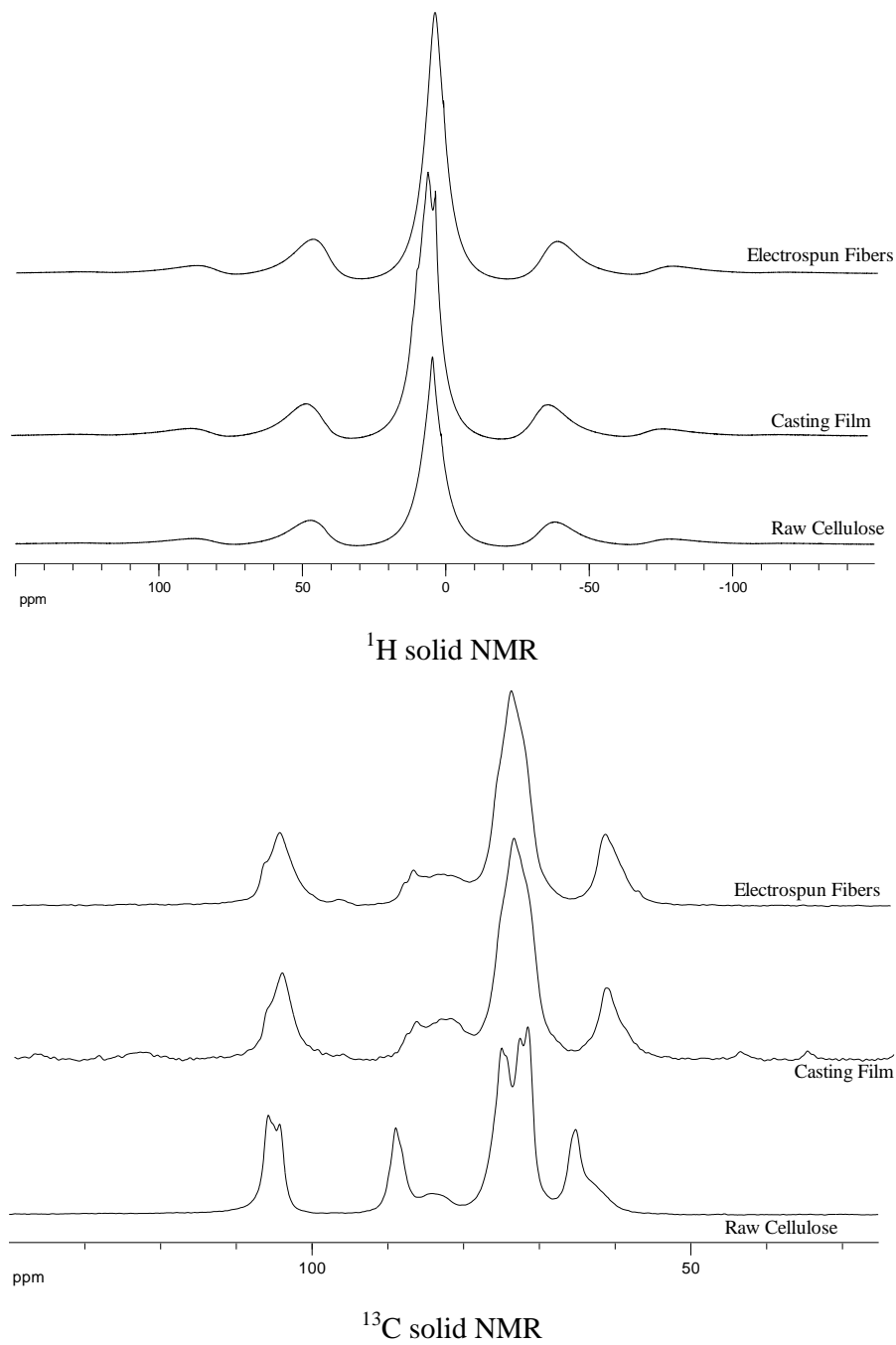
^{1}H solid NMR

^{13}C solid NMR

Fig. S7 ^{13}C and ^{1}H solid NMR of raw cellulose, regenerated casting film, and electrospun cellulose fibers from the neat [C$_2$mim][CH$_3$CO$_2$].
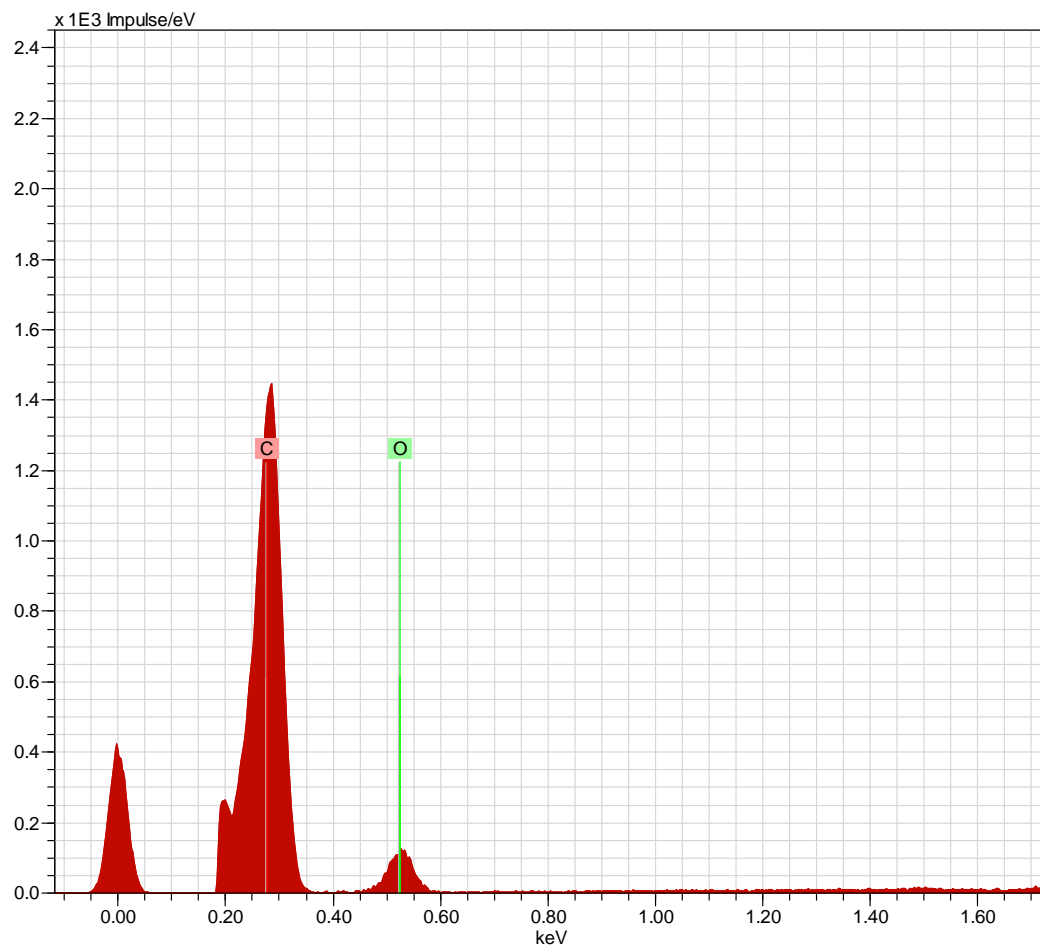
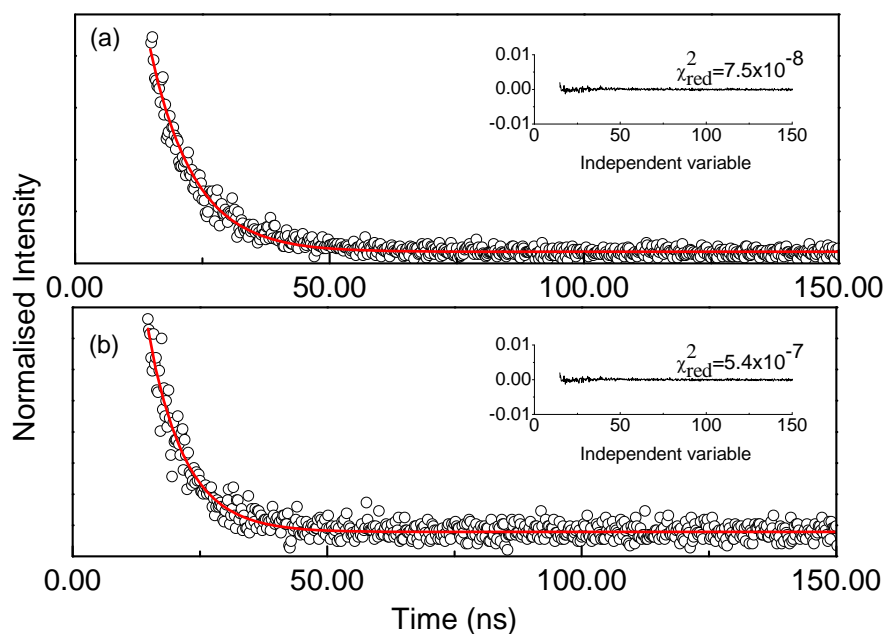**Fig. S8** FESEM-EDS results for the electrospun cellulose fibers.

Fig. S9 Emission decay curves excited at 330 nm and monitored at 460 nm for raw cellulose (a) and electrospun cellulose fibers from the neat $[C_2mim][CH_3CO_2]$ (b). The solid lines correspond to the data best fit using a single exponential function, $I(t)=I_0 \times exp(-(t-t_0)/\tau)$, where I_0 is the intensity at $t=t_0=14.76$ ns. The insets show the respective regular residual plots and the χ^2_{red} values for a better judgment of the fit quality.