## Supporting Information

## All-natural and highly flame-resistant freeze-cast foams based on

## phosphorylated cellulose nanofibrils

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## Supplementary data

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The TG and dTG/dT curves of P-CNF/Sep foams in nitrogen compared with those of pure P-CNF foam and the sepiolite, thermogravimetric data in nitrogen, the behavior of TEMPO CNF foam during cone calorimetry, photographs taken during the flame-penetration test showing the front and back surfaces of the P-CNF/Sep foam and SEM cross sectional micrographs of the P-CNF and P-CNF/Sep freeze-cast foams.



Figure S1. (a) TG; (b) dTG/dT curves of P-CNF and P-CNF/Sep foams and sepiolite in nitrogen.

 Table S1.
 Thermogravimetric data in nitrogen.

Sample	T <sub>onset10%</sub> (°C)	T <sub>Max</sub> (°C)	Residue at T <sub>Max</sub> (%)	Residue at 800 °C (%)	Organic residue at T <sub>Max</sub> (%)	Organic residue at 800 °C (%)
P-CNF foam	260	304	60	26	60	26
Sep	301	288	90	86	-	-
P-CNF/Sep foam	286	322	72	49	60	25



**Figure S2.** The pure TEMPO CNF foam behavior during cone calorimetry: (a) photograph taken a few seconds after ignition and photographs of the fresh foam and residue after cone calorimetry; (b) HRR curve.



**Figure S3.** Photographs taken 150 s after ignition of the front and back surfaces of the P-CNF/Sep foam during the flame penetration test.



**Figure S4.** SEM cross-sectional micrographs of (a) P-CNF foams; (b) P-CNF/Sep foams. The average pore diameters of the P-CNF and P-CNF/Sep foams were estimated to be  $8.98 \pm 2.26$  and  $6.86 \pm 1.91$  respectively.