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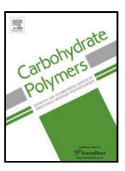
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Spray freeze-dried nanofibrillated cellulose aerogels with thermal

superinsulating properties

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Highlights:

• Nanofibrillated cellulose aerogels were successfully prepared by conventional freeze-

drying and spray freeze-drying process.

• Drastic changes appear in the morphology and the microstructure depending on the

process used.

• Spray freeze-drying allows the preparation of nanostructured aerogel with a fibril

skeleton morphology, having thermal superinsulating properties.

Abstract

Nanofibrillated cellulose (NFC) aerogels were prepared by spray freeze-drying (SFD). Their

structural, mechanical and thermal insulation properties were compared to those of NFC

aerogels prepared by conventional freeze-drying (CFD). The purpose of this investigation is

to develop superinsulating bioaerogels by reducing their pore size. Severe reduction of the

aerogel pore size and skeleton architecture were observed by SEM, aerogels prepared by SFD

method show a fibril skeleton morphology, which defines a mesoporous structure. BET

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