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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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