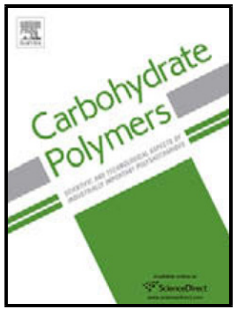

Title: Spray freeze-dried nanofibrillated cellulose aerogels with thermal superinsulating properties

Author: Clara Jiménez-Saelices Bastien Seantier Bernard Cathala Yves Grohens

PII: S0144-8617(16)31124-9
DOI: http://dx.doi.org/doi:10.1016/j.carbpol.2016.09.068
Reference: CARP 11595

To appear in:

Received date: 28-6-2016
Revised date: 8-9-2016
Accepted date: 22-9-2016

Please cite this article as: Jiménez-Saelices, Clara., Seantier, Bastien., Cathala, Bernard., & Grohens, Yves., Spray freeze-dried nanofibrillated cellulose aerogels with thermal superinsulating properties.*Carbohydrate Polymers* http://dx.doi.org/10.1016/j.carbpol.2016.09.068

Spray freeze-dried nanofibrillated cellulose aerogels with thermal superinsulating properties

Clara Jiménez-Saelices[a,b,c], Bastien Seantier* [a], Bernard Cathala[b], Yves Grohens[a]

[a] IRDL, UBS, FRE CNRS 3744, F-56100 Lorient, France

[b] UR1268 Biopolymères Interactions Assemblages, INRA, F-44316 Nantes, France

[c] Agence de l'environnement et de la Maîtrise de l'Energie 20, avenue du Grésillé- BP 90406 49004 Angers, France

Corresponding author: bastien.seantier@univ-ubs.fr. Tel: +33 2 97 87 45 89

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