Ice Templated Xylan-Nanocrystalline Cellulose Aero/Hydrogels

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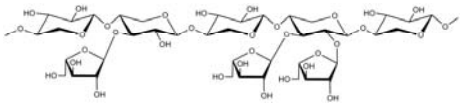
PROGRAM DESCRIPTION

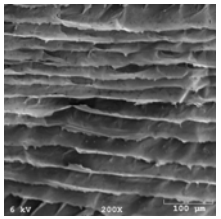
In the current trend for a more effective utilization of biomass, increased attention has been focused to the engineered exploitation of xylans as biopolymer resources in the development of new materials.

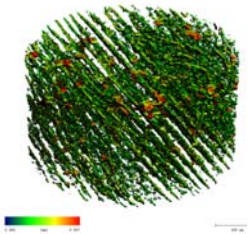


This study investigates how foams and hydrogels of xylan and nanocrystalline cellulose can be formed by using a freeze-casting technique.

TECHNICAL DETAILS

The pore morphology of the freeze casted materials are analyzed by using Scanning Electron Microscopy and Microcomputed Tomography.

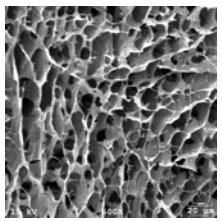


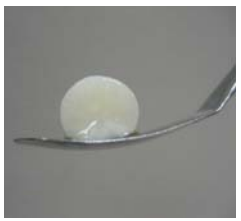


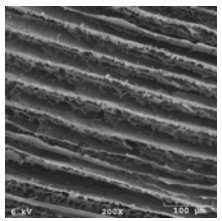
The pore structure-material property relationship is evaluated by compressive mechanical testing.

PAYOFF

A technique and a knowledge how to form novel biodegradable aero/hydrogels possessing controlled and tunable pore morphology.







KEY ACCOMPLISHMENTS

The pore morphology can be controlled by regulating xylan molecular structure and solidification conditions.

The formed xylan structures can be reinforced by addition of cellulose nanocrystals before the solidification step.

If cross-linking is induced during the sublimation operation, the porous materials will stay intact in the water swollen state.

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