Adsorption of Carbon Dioxide on Cellulose Nanofiber-Based Monolithic Cryogels Impregnated with Acetylated Cellulose Nanocrystals

Jiayuan Wei, Shiyu Geng, Shokat Sarmad, Jonas Hedlund, Kristiina Oksman

1Division of Materials Science, Department of Engineering Science and Mathematics
2Division of Chemical Engineering, Department of Civil, Environmental and Natural Resources Engineering
Luleå University of Technology, SE-971 87, Luleå, Sweden.

Introduction
Greenhouse gases such as CO₂ have caused a lot of environmental problems. Cellulose Nanofiber-based cryogel impregnated with acetylated cellulose nanocrystals is of low-carbon-footprint and can be used as CO₂ adsorbent.

Materials in this study:
- Cellulose nanofibers (CNF);
- Cellulose acetate (CA);
- Acetylated cellulose nanocrystals (aCNC).

Theory
Acetate groups can provide sites for specific interactions with CO₂, increasing the CO₂-philicity of the polymer.


Processing
Ice-templating gives CNF-based cryogel monolithic structure, resulting in a better adsorption behavior.

Dipping
Dipping CA or aCNC into the cryogel can improve the CO₂ capacity of the cryogel.

Microstructure of the cryogels
Scale bar: 200 µm

Mechanical properties

Breakthrough test
Capacity of CNF-i-aCNC: 1.49 mmol/g

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