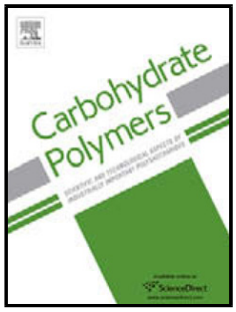

Title: Chitosan adsorption on nanofibrillated cellulose with different aldehyde content and interaction with phosphate buffered saline

Authors: Sedat Ondaral, Elif Çelik, Orçun Çağlar Kurtuluş, Elif Aşıkuzun, İsmail Yakın

PII: S0144-8617(17)31434-0
DOI: https://doi.org/10.1016/j.carbpol.2017.12.028
Reference: CARP 13090

To appear in:

Received date: 10-10-2017
Revised date: 22-11-2017
Accepted date: 12-12-2017

Please cite this article as: Ondaral S, Çelik E, Kurtuluş OC, Aşıkuzun E, Yakın I, Chitosan adsorption on nanofibrillated cellulose with different aldehyde content and interaction with phosphate buffered saline, *Carbohydrate Polymers* (2010), https://doi.org/10.1016/j.carbpol.2017.12.028

Chitosan adsorption on nanofibrillated cellulose with different aldehyde content and interaction with phosphate buffered saline

Sedat Ondaral[1*], Elif Çelik[1], Orçun Çağlar Kurtuluş[2], Elif Aşıkuzun[3], İsmail Yakın[4]

[1]Department of Pulp and Paper Technology, Forest Product Engineering, Faculty of Forestry, Karadeniz Technical University, 61080, Trabzon, Turkey

[2]Forest Product Engineering, Faculty of Forestry, Kastomonu University, 37150, Kastamonu, Turkey

[3]Department of Material Science and Nanotechnology,Faculty of Engineering and Architecture, Kastamonu University, 37150, Kastamonu, Turkey

[4]Setaş Chemical Inc, Research and Development Centre, 59520, Çerkezköy, Turkey

*Corresponding author (email address: ondaral@ktu.edu.tr

Highlights

- Aldehyde content of nanofibrillated cellulose affects chitosan adsorption.
- The adsorption behaviour chitosan completely changes after acetic acid treatment.
- Acid treated chitosan has more capacity to uptake PBS.
- Liquid interaction with chitosan/NFC matrix is limited by chitosan presence.

ABSTRACT

The chitosan adsorption on films prepared using nanofibrillated cellulose (NFC) with different content of aldehyde group was studied by means of Quartz Crystal Microbalance with Dissipation (QCM-D). Results showed that frequency change (Δf) was higher when the chitosan adsorbed on NFC film consisting more aldehyde group indicating the higher adsorption. The (Δf) and dissipation (ΔD) factors completely changed during adsorption of chitosan pre-treated with acetic acid: Δf increased and ΔD decreased, oppositely to un-treated chitosan adsorption. After acid treatment, molecular weight and crystallinity index of chitosan decreased addition to change in chemical structure. It was found that more phosphate buffered saline (PBS), as a model liquid for wound exudate, adsorbed to acid treated chitosan-NFC film, especially to film having more aldehyde groups. Comparing with bare NFC film, chitosan-NFC