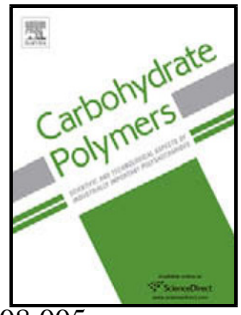

Title: Crystalline nanocellulose/lauric arginate complexes

Authors: Kai Chi, Jeffrey M. Catchmark

PII: S0144-8617(17)30871-8
DOI: http://dx.doi.org/doi:10.1016/j.carbpol.2017.08.005
Reference: CARP 12612

To appear in:

Received date: 4-6-2017
Revised date: 31-7-2017
Accepted date: 1-8-2017

Please cite this article as: Chi, Kai., & Catchmark, Jeffrey M., Crystalline nanocellulose/lauric arginate complexes.*Carbohydrate Polymers* http://dx.doi.org/10.1016/j.carbpol.2017.08.005

Crystalline nanocellulose/lauric arginate complexes

Kai Chi[1] and Jeffrey M. Catchmark[1] *

[1] Department of Agricultural and Biological Engineering, The Pennsylvania State University, University Park, PA 16802, USA.

*To whom correspondence should be addressed.

E-mail: jcatchmark@engr.psu.edu; Tel: 814-863-0414; Fax: 814-863-1031; Address: 308 Forest Resources Lab, University Park, PA 16802, USA.

Highlights

- Ionic strength and pH could dominate CNC-LAE binding interactions.
- Three driving forces were identified for CNC-LAE binding interactions.
- The adsorption of LAE to CNC notably impacted the properties of CNC.
- LAE adsorption is a green, sustainable surface modification way for CNC.

Abstract

As a novel sustainable nanomaterial, crystalline nanocellulose (CNC) possesses many unique characteristics for emerging applications in coatings, emulsions, paints, pharmaceutical formulations, and other aqueous composite systems where interactions with oppositely charged surfactants are commonly employed. Herein, the binding interactions between sulfated CNC and a novel biologically-derived cationic surfactant lauric arginate (LAE) were comprehensively examined. Ionic strength and solution pH are two crucial factors in determining the adsorption of LAE to the CNC surface. Three different driving forces were identified for CNC-LAE binding interactions. Additionally, it was found that the adsorption of LAE to the CNC surface could notably impact the surface potential, aggregation state, hydrophobicity and thermal stability of the CNC. This work provides insights on the binding interactions between oppositely charged CNC