www.elsevier.com/locate/memsci

Water vapor transport properties of regenerated cellulose and nanofibrillated cellulose films

Alemayehu H. Bedane, Mladen Eić, Madjid Farmahini-Farahani, Huining Xiao

PII: S0376-7388(15)00533-5
DOI: http://dx.doi.org/10.1016/j.memsci.2015.06.009
Reference: MEMSCI13767

To appear in: *Journal of Membrane Science*

Received date: 20 April 2015
Revised date: 8 June 2015
Accepted date: 10 June 2015

Cite this article as: Alemayehu H. Bedane, Mladen Eić, Madjid Farmahini-Farahani, Huining Xiao, Water vapor transport properties of regenerated cellulose and nanofibrillated cellulose films, *Journal of Membrane Science*, http://dx.doi.org/10.1016/j.memsci.2015.06.009

Water vapor transport properties of regenerated cellulose and nanofibrillated cellulose films

Alemayehu H. Bedane, Mladen Eić, Madjid Farmahini-Farahani, Huining Xiao

Addresses of the authors:

Alemayehu H. Bedane (Alemayehu.Bedane@unb.ca), **Mladen Eić*** (meic@unb.ca), **Madjid Farmahini-Farahani** (Madjid.Farahani@unb.ca), and **Huining Xiao** (hxiao@unb.ca): University of New Brunswick, Department of Chemical Engineering, Fredericton, NB, E3B 5A3, Canada.

Corresponding author:

***Mladen Eić,** University of New Brunswick, 15 Dineen Drive, Fredericton, N.B. Canada, E3B 5A3, Phone: (+1) 506-453-4689

Abstract

In this study, water vapor transport properties of nano-fibrillated cellulose (NFC) and regenerated cellulose films, derived from different sources, were investigated and compared with the transport properties of unmodified paper. Gravimetric-IGA experimental system was used to measure the kinetics and water vapor permeabilities (WVPs) of the samples. Water vapor adsorption-desorption isotherms were measured for different cellulose films using Belsorp instrument. Monolayer moisture content was determined by fitting the adsorption isotherm with the Guggenheim-Anderson-De Boer equation (GAB model). The monolayer moisture content of the regenerated cellulose and NFC films were found to be more than two times larger than the monolayer moisture content obtained for unmodified paper sample (made from bleached Kraft pulp ~ 4.12 wt. %), at saturation. This indicates a large number of hydrophilic sites available on the surface of regenerated cellulose and NFC films.