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Surface Modification of Bacterial Cellulose Membrane by Oxygen Plasma Treatment

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Abstract

In order to fabricate cellulose membranes for filtration in various applications, a study on changes in properties of bacterial cellulose by treatments with oxygen plasma has been carried out. Bacterial cellulose was produced from *Acetobacter xylinum* as a thin membrane of 0.01 μm pore size with hydrophilic property. Plasma treatments of the membranes were conducted under the variation of pressure, time exposure, and net power dissipation from the RF source using oxygen gas. At 250 kPa, the averaged water flux of the membranes was only 5 $Lm^{-2}h^{-1}$ and was reduced further after plasma treatment, regardless of changes in obtained water droplet surface contact angle. ATR-FTIR results showed changes in functional groups of this biomaterial after treatment. The peak at 713 cm^{-1} for O-H out-of-plane bending increased remarkably. An enlargement of peak at 3340 cm^{-1} indicated the higher number of water molecules surrounding the membrane resulting in a change to a more hydrophilic membrane which is in good agreement with the result from surface contact angle measurement.

Keywords: Cellulose, Plasma modification, *Acetobacter xylinum*, Water flux

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