



Application of cellulose to water purification

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Native cellulose is one of the most abundant environmentally friendly and biocompatible renewable resources in the world. Unfortunately, due to strong hydrogen bond interactions, cellulose cannot be dissolved easily by most ordinary solvents. The use of ionic liquids and of TEMPO-mediated oxidation of cellulose, together with its rapid dissolution in pre-cooled (-12) 7 wt% NaOH-12 wt% urea aqueous solution, has changed the outlook for cellulose as a viable green polymer towards many new applications. In the present lecture, the application of cellulose as a top barrier layer coating in ultra-filtration membranes is discussed.

A common ionic liquid, 1-butyl-3-methylimidazolium chloride was used as the solvent to dissolve cellulose under mild conditions. The oxidized cellulose via the TEMPO approach forms nano-fibers that can be suspended in aqueous media. A cellulose top barrier layer could be fabricated by using a standard coating method with the surface morphology and thickness of the cellulose layer being investigated by SEM. In the new three tier composite ultra-filtration (UF) membrane, we have also introduced an electro-spun nano-fibrous mid-layer. Together with a non-woven PET base support, the flux of the composite membrane was many times higher than some commercial membranes, while a rejection of above 99.5% was obtained for an emulsified oil/water test solution.

Acknowledgements

Acknowledgement is made to the National Science Foundation and the Office of Naval Research for their support.

Main Contributors:

- (1) For electro-spinning technology: Dr. Dufei Fang
- (2) For ultra-filtration: Dr. Hongyang Ma