Thin-film membranes made from rice straw nanofibers isolated from high-lignin neutral sulfite pulp and bleached sulfite pulp.

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Abstract

There is an increasing interest during last years in isolating cellulose nanofibers from unbleached cellulose pulps due to economic, environmental, and functional reasons. In the current work, cellulose nanofibers isolated from unbleached neutral sulfite pulp (RSNF) were compared to those isolated from bleached neutral sulfite pulp in making thin-film ultra-filtration membranes by simple vacuum filtration on hardened filter paper. The prepared membranes were characterized regarding their microscopic structure, hydrophilicity, pure water flux, fouling, and removing lime nanoparticles and oil from oil-in-water emulsion. Using cellulose nanofibers isolated from unbleached pulp resulted in easier formation of thin-film membrane (shorter filtration time) and higher water flux than in case of using nanofibers isolated from bleached fibers, without sacrificing its ability to remove the lime nanoparticles or oil from its emulsion.

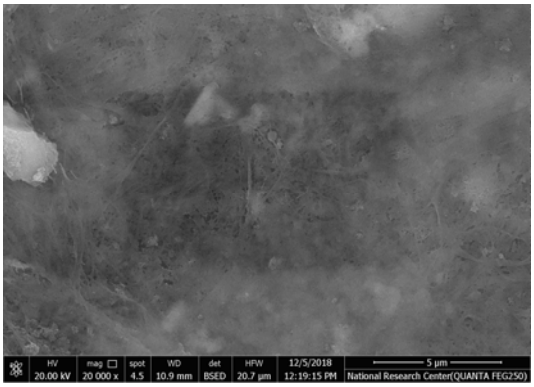


Figure 1: SEM image of membrane surface made from unbleached RSNF.

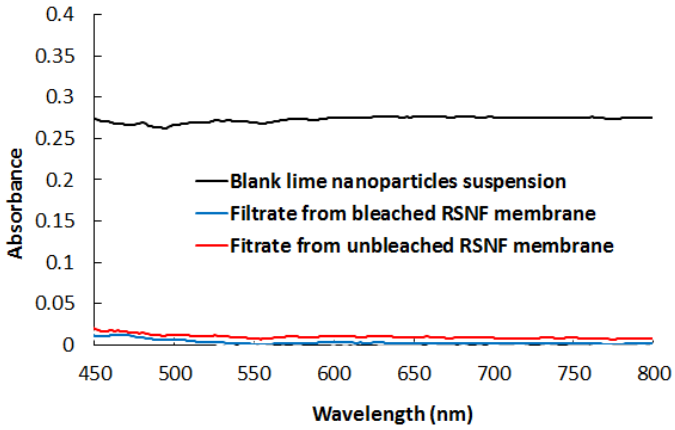


Figure 2: Visible absorption spectra of blank lime nanoparticles suspension and filtrate after passing through the membrane.

Recent Publications

1. Hassan, M., Berglund, L., Hassan, E., Abou-Zeid, R., Oksman, K. (2018) Effect of xylanase pretreatment of rice straw unbleached soda and neutral sulfite pulps on isolation of nanofibers and their properties. Cellulose, 25: 2939-2953.
2. Wang, Z., Zhang, W., Yu, J., Zhang, L., Liu, L., Zhou, X., Huang, C., Fan, Y. (2019). Preparation of nanocellulose/filter paper (NC/FP) composite membranes for high-performance filtrationCellulose, 26: 1183-1194.
3. Hassan, E., Hassan, M., Abou-zeid, R., Berglund, L., Oksman, K. (2017). Use of bacterial cellulose and crosslinked cellulose nanofibers membranes for removal of oil from oil-in-water emulsions.Polymers, 9: art. no. 388, .
4. Hassan, M., Abou-Zeid, R., Hassan, E., Berglund, L., Aitomäki, Y., Oksman(2017) Membranes based on cellulose nanofibers and activated carbon for removal of Escherichia coli bacteria from water. Polymers, 9: art. no. 335, .
5. Hassan, M., Hassan, E., Fadel, S.M., Abou-Zeid, R.E., Berglund, L., Oksman, K. (2018)Metallo-Terpyridine-Modified Cellulose Nanofiber Membranes for Papermaking Wastewater Purification(2018) Journal of Inorganic and Organometallic Polymers and Materials, 28: 439-447.



Biography

Dr.Mohammad Hassan has expertise and interest in nanocelluloses and their isolation technologies,bionanocomposites, and their applications is areas related to membranes for water treatment, tissue engineering, drug release systems, paper making, flexible electronics, packaging, and conservation of heritage.

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Notes/Comments: