Application of Nanotechnology in Water Desalination by using Nanocellulose Extracted from Solid Agricultural Wastes

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Abstract

Technological advances in reverse osmosis (RO) membranes during the past decade have significantly reduced the energy cost of water production via desalination.1-Cellulose is an abundant natural material, low environmental, health and safety risks

andLow cost .Cellulose was extracted from Egyptian cotton stalks and rice straw and convert it to Nanocellulose. The Nanocellulose acetate was investigated by Fourier transform infrared spectroscopy (FTIR),HNMR, scanning electron microscopy(SEM), XRD and Gel electrophoresis Where the membrane was studied by FTIR, SEM, Mechanical properties, water contact angle measurements and water content measurements. It was found with size about 22nm for rice straw and 28 nm for cotton stalks and with molecular weight 29000 for rice and 30000 for cotton and then convert Nanocellulose to Nanodicellulose acetate which use in fabrication of Reverse osmosis membrane. The XRD results indicates that Nanocellulose enhance crestalinity while mechanical test proved that Nano cellulose acetate increase mechanical properties comparing with cellulose acetate membrane The surface hydrophilicity of Nanocellulose acetate membranes were enhanced as the contact angle reached 40.5^0 in case of Nano rice cellulose acetate (NRCA), 35.8^0 in case of Nano cottoncellulose acetate (NCCA).Addition of polyethylene glycol to nano CA-RO membrane increase hydrophilicity as the contact angle reached 23.9^0 values of water flux and salt rejection for CA-RO membrane tested in 10,000 ppm NaCl, the water flux was 1.1 L/m2 h and salt rejection94%, while the water flux and salt rejection of Nanocellulose rice straw membrane (NRCA) and for Nanocellulose acetate extracted from cotton stalks (NCCA) at 4 bar. Were 99.3% and 41 for RNCA and 98.4% 20 for NCCA respectively.Nanocellulose acetate membrane has been applied to reverse osmosis for desalination due tochlorine tolerance and biofouling resistance. Where fouling on surface of CA membrane 70% while 25% of NRCA and 16% of NCCA. This study could contribute to develop a Nanocellulose acetate RO membrane for desalination application.

Image

Recent Publications

- “Application Of Nanotechnology As A Model For Degradation Of Organic PollutantsInIndusterial Waste Water Using PhotocatalyticMaterials”Moustafa.M.S,Abbssy,WagihA.Sedik,AmiraS.Mahmoud. Egy.J.PlantPro.Res.4(2):56-81(2016)
- **Patent:**

I have a patent in title:Desalination of Brackish Water by Using Nanocellulose Extracted from Rice Straw and Cotton Stalks.2018



Biography (150 word limit)

Amira Salah has her expertise in fabrication and application of nanomaterials in water treatment and water desalination, Fabrication of reverse osmosis membranes ,Water treatment Nanomaterials&nanofibers preparation. Her study based on extraction and fabrication of Nanocellullose from solid agricultural wastes and converting it to nanocellulose which use in water desalinationt and she has a paten in this field, also she is a vice dean of Arabic center of Nanotechnology (CAN) also she is a member of Arabic organization for operation and maintainance in Arabic countries (OMANTC) material and member of American material research society .

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Notes/Comments: