

Author's Accepted Manuscript

Electrically conductive membranes for in situ fouling detection in membrane distillation using impedance spectroscopy

Farah Ejaz Ahmed, Nidal Hilal, Raed Hashaikeh



PII: S0376-7388(18)30333-8
DOI: <https://doi.org/10.1016/j.memsci.2018.03.069>
Reference: MEMSCI16063

To appear in: *Journal of Membrane Science*

Received date: 4 February 2018
Revised date: 14 March 2018
Accepted date: 24 March 2018

Cite this article as: Farah Ejaz Ahmed, Nidal Hilal and Raed Hashaikeh, Electrically conductive membranes for in situ fouling detection in membrane distillation using impedance spectroscopy, *Journal of Membrane Science*, <https://doi.org/10.1016/j.memsci.2018.03.069>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Electrically conductive membranes for in situ fouling detection in membrane distillation using impedance spectroscopy

Farah Ejaz Ahmed¹, Nidal Hilal², Raed Hashaikeh^{1*}

¹Department of Chemical Engineering, Khalifa University of Science and Technology, Masdar Institute, P.O. Box 54224, Abu Dhabi, United Arab Emirates

²Centre for Water Advanced Technologies and Environmental Research (CWATER), College of Engineering, Swansea University, Swansea SA2 8PP, UK

*Corresponding author. Phone: +971-28109152. rhashaikeh@masdar.ac.ae

Abstract

Online monitoring of fouling in desalination processes enables early and appropriate action for fouling control. This study demonstrates the use of Electrochemical Impedance Spectroscopy (EIS) to electrically conductive membranes for online monitoring of fouling by eliminating the need for external electrodes and/or canary cells. Electrically conductive membranes are prepared by incorporation of silica in carbon nanostructures and subsequent fluorination to yield hydrophobic membranes. These membranes are applied to direct contact membrane distillation with 99.9% salt rejection and a flux of 4.3 LMH. EIS is used for online monitoring of inorganic fouling on the membrane surface during the MD process. Impedance spectra taken over a duration of 15 hours indicated that impedance in the low frequency (<100 Hz) region gradually decreased with fouling early on, and increased towards the end. Impedance-based monitoring is more sensitive to changes in the system than monitoring of flux and permeate conductivity. This

Download English Version:

<https://daneshyari.com/en/article/7019857>

Download Persian Version:

<https://daneshyari.com/article/7019857>

[Daneshyari.com](https://daneshyari.com)