

Accepted Manuscript

Title: Synergistic Effect of UV Irradiation and Thermal Annealing to Develop High Performance Polyethersulfone-nano Silica Membrane for Produced Water Treatment

Authors: Tutuk Djoko Kusworo, Dani Puji Utomo, Nita Aryanti, Qudrotun

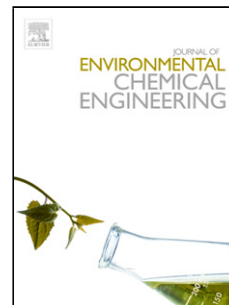
PII: S2213-3437(17)30286-5
DOI: <http://dx.doi.org/doi:10.1016/j.jece.2017.06.035>
Reference: JECE 1697

To appear in:

Received date: 22-3-2017
Revised date: 30-5-2017
Accepted date: 18-6-2017

Please cite this article as: Tutuk Djoko Kusworo, Dani Puji Utomo, Nita Aryanti, Qudrotun, Synergistic Effect of UV Irradiation and Thermal Annealing to Develop High Performance Polyethersulfone-nano Silica Membrane for Produced Water Treatment, Journal of Environmental Chemical Engineering <http://dx.doi.org/10.1016/j.jece.2017.06.035>

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 proof before it is published in its final 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.



Synergistic Effect of UV Irradiation and Thermal Annealing to Develop High Performance Polyethersulfone-nano Silica Membrane for Produced Water Treatment

Tutuk Djoko Kusworo^{1*}, Dani Puji Utomo¹, Nita Aryanti¹ and , Qudrotun²

¹Department of Chemical Engineering, University of Diponegoro, Semarang, 50239, Indonesia
Phone/Fax: +62-24-7460058

²Nano Center Indonesia, South Tangerang, Indonesia

*Corresponding author: tdkusworo@che.undip.ac.id

Highlights

- The performance enhancement of PES-Nano silica membrane using photo and thermal treatment has been performed
- The effects of UV irradiation on the PES-Nano silica membrane morphology and performed are discussed
- The consequences of thermal annealing on the PES-Nano silica membrane morphology and performed are examined
- The synergistic effects of combined treatments of UV irradiation and Thermal annealing are reported

ABSTRACT

The current problems in membrane separation are mostly related the low permeability and high foulant deposition of the membranes. Polyethersulfone-nano silica membrane was developed to produce membranes with high permeation. However, it reduced the selectivity of the membrane due to microvoid formation between the inorganic filler and polymer. UV irradiation and thermal annealing treatments were synergistically applied to Polyethersulfone-nano silica membrane to overcome the mentioned problem. The nano-sized silica was incorporated in the polyethersulfone as an inorganic filler using solution-casting dry/wet phase inversion technique. After exposing the membrane film under the UV ray, the thermal annealing was applied at varying temperatures and annealing time. Produced water treatment experiments showed that the combination of UV irradiation and thermal annealing on the membrane improved water permeability and selectivity due to the synergistic effect of the both treatments. The longer thermal annealing treatment slightly reduced the permeability, but increased the selectivity. Separation performance of the UV irradiated and thermal annealed PES-nano silica membrane was better than the existing membranes. The UV irradiation and thermal annealing process are beneficial for improving the permeability and selectivity of the PES-nano silica membrane.

Download English Version:

<https://daneshyari.com/en/article/4908685>

Download Persian Version:

<https://daneshyari.com/article/4908685>

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