

## Author's Accepted Manuscript

Biofouling Phenomena on Anion Exchange Membranes Under the Reverse Electrodialysis Process

Mahboobeh Vasselbehagh, Hamed Karkhanechi, Ryosuke Takagi, Hideto Matsuyama



PII: S0376-7388(16)32345-6  
DOI: <http://dx.doi.org/10.1016/j.memsci.2017.02.036>  
Reference: MEMSCI15095

To appear in: *Journal of Membrane Science*

Received date: 25 November 2016  
Revised date: 21 February 2017  
Accepted date: 22 February 2017

Cite this article as: Mahboobeh Vasselbehagh, Hamed Karkhanechi, Ryosuke Takagi and Hideto Matsuyama, Biofouling Phenomena on Anion Exchange Membranes Under the Reverse Electrodialysis Process, *Journal of Membrane Science*, <http://dx.doi.org/10.1016/j.memsci.2017.02.036>

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

## Biofouling Phenomena on Anion Exchange Membranes Under the Reverse Electrolysis Process

Mahboobeh Vasselbehagh, Hamed Karkhanechi, Ryosuke Takagi\*, Hideto Matsuyama\*\*

Center for Membrane and Film Technology, Department of Chemical Science and Engineering, Kobe University, 1-1 Rokkodai, Nada-ku, Kobe 657-8501, Japan

mvaselbehagh@gmail.com

hkarkhanechi@gmail.com

takagi@harbor.kobe-u.ac.jp

matuyama@kobe-u.ac.jp

\*Corresponding authors. Tel./fax: +81 78 803 6180.

### Abstract

Reverse electrolysis (RED) is an electrochemical process for converting salinity gradient energy into electric energy. Biofouling of anion exchange membranes (AEMs) is a severe problem affecting RED performance. In this study, we examined the biofouling of AEMs during RED and attempted to improve the anti-biofouling properties of AEMs through surface modification. Biofouling was evaluated from the bacterial coverage percentage, obtained from surface analysis using scanning electron microscope (SEM) images of fouled AEM surfaces. The results showed that a polydopamine (PDA) coating improved the anti-biofouling properties of AEM under RED operation. Furthermore, in order to investigate the effect of electric current and electric field, RED was performed under open circuit conditions (i.e., only an electric field was generated) in addition to normal RED, which generated both an electric current and an electric field. Both the generated electric current and the generated electric field suppressed bacterial attachment on the AEM surface, thereby enhancing the anti-biofouling properties of AEMs along with the PDA modification. It was also found that electric current changed the shape of bacteria.

**Keywords:** Reverse electrolysis; Anion exchange membrane; Biofouling; Polydopamine; Electric current and field

Download English Version:

<https://daneshyari.com/en/article/4988878>

Download Persian Version:

<https://daneshyari.com/article/4988878>

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