

Author's Accepted Manuscript

Interaction between membrane and organic compounds studied by atomic force microscopy with a tip modification

Hui Lei, Na Cheng, Jianwei Zhao



PII: S0376-7388(18)30607-0
DOI: <https://doi.org/10.1016/j.memsci.2018.04.002>
Reference: MEMSCI16086

To appear in: *Journal of Membrane Science*

Received date: 7 March 2018
Revised date: 4 April 2018
Accepted date: 4 April 2018

Cite this article as: Hui Lei, Na Cheng and Jianwei Zhao, Interaction between membrane and organic compounds studied by atomic force microscopy with a tip modification, *Journal of Membrane Science*, <https://doi.org/10.1016/j.memsci.2018.04.002>

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.

Interaction between membrane and organic compounds studied by atomic force microscopy with a tip modification

Hui Lei^{a*}, Na Cheng^b, Jianwei Zhao^{b*}

a: GE (China) Research and Development Center, Shanghai 201203, China

b: College of Material and Textile Engineering, China-Australia Institute for Advanced Materials and Manufacturing, Jiaying University, Jiaying 314001, China

leihuilh@hotmail.com (H. Lei),

jwzhao@mail.zjxu.edu.cn (J. Zhao)

* To whom all correspondence should be addressed.

Abstract:

Membrane fouling by organic, inorganic and biological materials is a significant cause of the increased operational costs in the membrane separation processes such as reverse osmosis, nanofiltration, ultrafiltration and microfiltration. To better understand the fouling mechanism and increase the membrane performance via optimizing membrane structure, elucidation of the physicochemical interactions between membranes and foulants is essential. Atomic force microscopy (AFM) has been proved to be a powerful method to qualitatively characterize the interaction force between the tip and the substrate. In this paper, the AFM tips were modified to bear five representative organic end-groups: benzyl, hexyl, propionic acid, ethylamine hydrochloride, sodium propyl sulfonate, which are commonly found in organic foulants. The adhesion force between the modified AFM tip and the reverse osmosis membrane was measured carefully to understand the potential fouling tendency of each category function group on the membrane. The results showed the average interaction force between the tip modified by $-(\text{CH}_2)_3\text{-SO}_3\text{Na}$ group and membrane is 13.80 nN, which is as twice as the force between membrane and the unmodified tip. The results also showed that the tips modified by $-(\text{CH}_2)_2\text{-COOH}$ group and $-(\text{CH}_2)_3\text{-SO}_3\text{Na}$ group, have stronger interaction force with the membrane surface than the tips modified by three other end-groups, which indicated

Download English Version:

<https://daneshyari.com/en/article/7019868>

Download Persian Version:

<https://daneshyari.com/article/7019868>

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