

## Biofouling characteristics of reverse osmosis membranes during dyeing wastewater desalination

Jianhong Shi<sup>a,b</sup>, Yinglong Su<sup>a,b</sup>, Chongxin Du<sup>a,b</sup>, Bing Xie<sup>a,b,\*</sup>

<sup>a</sup>Key Laboratory of Urbanization and Ecological Restoration of Shanghai, School of Ecology and Environmental Science, East China Normal University, Shanghai 200241, China, Tel. +86 021 54341276; emails: bxie@des.ecnu.edu.cn (B. Xie) shijh910204@163.com (J. Shi), lydsyl@126.com (Y. Su), 616537532@qq.com (C. Du)

<sup>b</sup>Shanghai Institute of Pollution Control and Ecological Security, Shanghai 200092, China

Received 9 June 2018; Accepted 24 December 2018

---

### ABSTRACT

Membrane biofouling is an unevadable problem that occurs during the reverse osmosis (RO) desalination of dyeing wastewater; therefore, it is necessary to minutely understand biofouling characteristics of RO membranes to effectively hinder the fouling. In this study, two sets of laboratory-scale desalination systems of biologically treated dyeing wastewater were operated, respectively, for 10 and 30 d, and the performance and biofouling of RO membrane were investigated. The obvious decrease of permeate flux after 10 d of operation reflected a more serious membrane fouling. The analysis on surface morphology, foulant characteristics, and active biomass of membrane fouling layer exemplified that biofouling was perhaps responsible for the permeate flux decline, and the fouling was more serious after operation of 30 d than that of 10 d. Further, bacterial community of biofilm showed that Proteobacteria was the most predominant, followed by Firmicutes and Bacteroidete. The relative abundance of  $\gamma$ -Proteobacteria significantly decreased and that of  $\alpha$ -Proteobacteria, Clostridia, and Sphingobacteria increased with operation time, which seemed to facilitate the more developed/mature biofilm formation. The results would provide fundamental information for effective strategy on prevention and control of membrane biofouling during RO desalination of dyeing wastewater.

*Keywords:* Dyeing wastewater; Reverse osmosis membrane; Biofouling; Bacterial community

---

\* Corresponding author.