



Fluorescence spectrum-based biofouling prediction method for RO membrane systems

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ABSTRACT

Monitoring reverse osmosis (RO) membrane conditions is an important task because it helps reduce the operation and maintenance cost in the RO membrane desalination systems by achieving long membrane lifetime and energy saving. As biological interactions between the membrane itself and microorganism cause the rapid degradation of membrane performance, it is crucial to identify and quantify potential biofoulants that are sensitive to each specific RO membrane. This study proposed a biofouling prediction method that indirectly quantifies the degree of biofouling by comparing the fluorescence excitation-emission matrix (EEM) of foulants sampled on the fully fouled RO membrane and those of brine samples from currently operating RO system. The experiment showed that the similarity distance measured from the comparison between the two fluorescence EEMs tends to increase when brine samples were secured from relatively clean RO membranes.

Keywords: Similarity measuring; Biofouling; Reverse osmosis membrane; Fluorescence excitation-emission matrix; Principal component analysis

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