A review of recent advance in fouling mitigation of NF/RO membranes in water treatment: pretreatment, membrane modification, and chemical cleaning

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ABSTRACT

Currently, nanofiltration (NF) and reverse osmosis (RO) membranes are the most widely employed in surface water treatment, but membrane fouling has always been an important problem in the process of its application and scientific community paid wide attentions to this issue. This paper aims at reviewing the recent reports about fouling mitigation of NF/RO membranes, mainly focusing on the feed water pretreatment and membrane modification. In generally, high-quality feed water can ensure long-term stability of the membrane systems through altering size distribution of foulant, reducing its affinity to membrane surface and removing microbial nutrient source. Membrane modification can also effectively enhance anti-fouling capacity of NF/RO membranes by tailoring surface hydrophilicity, roughness, zeta potential, and functional groups so as to reduce the interaction between membrane surface and foulants. Besides, in order to recover the membrane flux of NF/RO systems, chemical cleaning is inevitable. The interaction mechanisms between chemical agent and foulant cake layer on the membrane surface and existing problems in chemical cleaning progress are also summarized. At last, the future research direction in this field is identified.

Keywords: Membrane fouling; Pretreatment; Membrane modification; Chemical cleaning

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