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Fouling behaviors of humic acid, alginate and bovine serum albumin in reverse electrodialysis for salinity gradient power generation

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ABSTRACT

Reverse electrodialysis (RED) is considered as a promising option to harvest renewable energy from the mixing of seawater and fresh water since approximately 2 TW of renewable energy can be theoretically generated from the global river outfalls into the oceans (Mei and Tang, 2018). Furthermore, RED may offer several advantages, including direct electricity generation from salinity gradient and lower fouling tendency (Daniilidis et al., 2014). However, membrane fouling by dissolved organic matter (DOM) is still a major concern in its practical applications for salinity gradient power generation. In general, humic substances, carbohydrates, and proteins are found to be major constituents of DOM in natural waters (i.e., surface water and seawater) (Susanto et al., 2017). In this study, fouling behaviors of humic acid, alginate and bovine serum albumin in RED under various feed water conditions were comprehensively investigated and directly correlated to the changes in the pressure drop and net power density to offer deeper insights into the fouling mechanisms of the RED system for salinity gradient power generation.

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