An experimental approach to explore cleaner systems for desalination membranes

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ABSTRACT

Organic fouling massively influences the performance of polymer membranes used in desalination processes. Due to the complexity of the fouling processes there is no complete picture of the involved interactions yet and targeted strategies to overcome membrane fouling are missing [1]. Defined and reproducible testing strategies are essential for the successful development of effective cleaner systems. To address this need, we introduce a multicomponent fouling model mimicking the initial biomolecular adsorption of proteins, humic acids and polysaccharide substances onto membrane surfaces. Utilizing well defined thin films made of polyamide mimicking the outermost layer of TFC-membranes allowed us to study the adsorption and subsequent removal of (model-) fouling components. Adsorption and desorption (cleaning-) experiments were done utilizing quartz crystal microbalance (QCM) and ellipsometry. Cleaning efficiency of acids, surfactants and chelats was analyzed. The results show chelats to be most effective as cleaning agents.

Keywords: RO/NF membranes; Organic fouling; Chelats; Acids; Surfactants

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