

A Feasibility Study of Capacitive Deionization for Draw Solute Separation in FO Desalination Process

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A desalination method has been shifting from thermal methods into membrane-based ones as energy problem has been taken seriously nowadays. One of promising method using membrane is forward osmosis (FO) process. FO process simply induces water permeation from seawater to draw solution of higher concentration by osmotic pressure difference. Accordingly, no external energy is required unlike RO process. However, pure water separated by FO process is contained in draw solution and should be re-separated from draw solution. To strengthen the benefit of using FO desalination process, draw solute separation process should require little energy. In this work, capacitive deionization (CDI) is studied as a candidate of draw solute separation. Using CDI, salt ions contained in salt-dissolved draw solution can be adsorbed by electrical double layer which is charged either positively or negatively. In order to identify its feasibility, FO membrane and CDI separation process are independently modeled, and then performance and energy requirement are evaluated using a developed model.