Mini Review

Potential Application of Membrane Capacitive Deionization for Heavy Metal Removal from Water: A Mini-Review

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Heavy metal pollution of the aquatic environment has become a global concern in recent decades, and conventional methods for heavy metal removal, like coagulation, precipitation, and membrane filtration, have their limitations. In this mini-review, we discuss four aspects of heavy metal removal by membrane capacitive deionization (MCDI): i) the role of electrode materials; ii) role of ion-exchange membrane; iii) operating conditions; and iv) water chemistry. Based on this discussion, we determine MCDI to have good potential for heavy metal removal in water. Future MCDI studies should focus on synthesizing ion-selective electrode to promote the removal of specific ionic species; developing multifunctional electrodes for the simultaneous removal of different heavy metals; performing pilot-scale studies instead of bench-scale ones; applying MCDI to raw water or real-life water samples and controlling MCDI with different current modes.

Keywords: capacitive deionization; heavy metal; arsenic; cadmium; pulsed current

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