Abstract Submitted
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Capacitive Deionization: Performance Improvement Using Multistep Buffered Arrangement and Ordered Mesoporous Carbon Electrodes[1] YASAMIN SALAMAT, CARLOS RIOS PEREZ, ANVESH GURIJALA, RANDALL ERB, CARLOS HIDROVO, Northeastern University — Capacitive deionization (CDI) is an emerging novel technology for water treatment which uses an electrical field to adsorb ions to oppositely charged high porous media. The most distinguished feature of CDI is its ability to retrieve a fraction of the energy consumed for desalination during the regeneration cycle. Here, we propose a new architecture aiming to improve the overall performance of CDI. In this method, an array of CDI cells are connected in series with solution buffers in between them. The buffer solution homogenizes the outlet concentration of the preceding cell and supplies a constant concentration reservoir for the next cell. The performance of the proposed CDI system with two CDI cells and one solution buffer was compared with a two-cascaded-cells array with no solution buffer. The obtained results demonstrated the superiority of the proposed buffered system, in terms of desalination percentage. In addition, a new method for fabricating ordered mesoporous carbon electrodes was introduced aimed at reducing the electrical resistance of the system and enhancing its adsorption capacity. Performance of the electrodes was evaluated using Electrochemical Impedance Spectroscopy (EIS) and Cyclic Voltammetry (CV). The proposed methods provide great potentials for CDI to be implemented in larger scales and industrial applications.

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