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Enhanced capacitive deionization by nitrogen-doped porous carbon nanofiber aerogel derived from bacterial-cellulose

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Abstract

In this work, nitrogen-doped carbon nanofiber aerogels (N-CNFA) were successfully prepared by freeze-drying and thermal treatment of bacterial cellulose in NH_3 atmosphere. Scanning electron microscopy, transmission electron microscopy, X-ray photoelectron spectroscopy were used to characterize their morphology and structure. Nitrogen adsorption-desorption isotherms show that nitrogen doping can improve the specific surface area of CNFA obviously. The electrochemical measurments show that N-CNFA possesses higher specific capacitance and lower charge tranfer resistance than undoped CNFA. The electrosorption capacity of N-CNFA can reach up to 17.29 mg g^{-1} in 1000 mg L^{-1} NaCl solution, much higher than that of undoped CNFA (12.81mg g^{-1}). These results indicate that N-CNFA should be a promising candidate for CDI application.

Keywords: carbon nanofibers aerogels; capacitive deionization; nitrogen doping; desalination

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