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Highly efficient capacitive deionization electrodes from electro spun carbon nanofiber membrane containing reduced graphene oxide and carbon nanotubes

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ABSTRACT

Carbon nanofibers containing reduced graphene oxide (RG) and carbon nanotubes (CNTs) were prepared via electro spinning and carbonization. The addition of carbon nanotubes was found to be embedded within the inner fibers and graphene sheets, which are beneficial to provide more defects and mesopores. Without any binder, the tri-component nanofibers were directly used as CDI electrodes, which showed a desalination capacity of 13.6 mg g^{-1} in a 500 mg L^{-1} NaCl solution with a remarkable cyclic stability and 98% capacitance retention after 1000 cycles of charging-discharging. The presence of reduced graphene oxide and carbon nanotubes was found to effectively improve conductivity and electro sorption efficiency. Such a tri-component carbon nanofibrous sheet may be useful for making high performance electrodes for various CDI applications.

Keywords: Carbon nanofibers; Electro spinning; Graphene; Capacitive deionization; Carbon nanotubes

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