

Improved electrosorption capacity of ACF-based electrodes by oxyfluorination

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The capacitive deionization (CDI) is considering a promising desalination process. In this study, activated carbon fibers (ACFs) were oxyfluorinated using mixture of fluorine and oxygen gases at different partial pressure ($F_2:O_2=1:9, 2:8, 3:7$) in order to increase electrosorption capacity. The chemical changes of the surface functional groups of the untreated and oxyfluorinated ACFs were investigated using XPS. The specific surface area and pore volume of the prepared samples were confirmed via N_2 adsorption at 77 K using an ASAP 2020. The CDI process was carried out at an electric potential of 1.2 ~0 V in 500 ppm sodium chloride solution at 20 ml/min flow rate. The specific electrosorption capacity of optimized electrode ($F_2:O_2=3:7$) was 14.5 mg/g, which was increased 116% compared to that of untreated electrode (6.7 mg/g) because the co-ion expulsion effect was decreased by the fluorine and oxygen functional groups on the ACF.