

Activation of graphite felt for highly effective electrode in vanadium redox flow batteries

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For the vanadium redox flow battery (VRFB) electrodes, carbon materials, especially the polyacrylonitrile (PAN)-based graphite felt, are most widely chosen mainly due to their stability in highly acidic electrolytes. However, pristine graphite felt has low electrochemical activity, which severely hinders the redox reaction kinetics. Thus, extensive efforts have been committed to activate graphite felt. The most common way involves the introduction of oxygen-containing groups to the surface of graphite felt including air/heat treatment, acid reflux treatment, electrochemical oxidization, plasma treatment. Although these methods can successfully enhance the performance of graphite felt, they are often prone to consuming large amount of energy or require long treatment time. In this regard, we introduced nitrogen functional groups and ozone gas as a quick and effective activation process for a graphite felt. Ozone is a highly reactive agent and an environmental-friendly process. It was found that these methods are beneficial to improve kinetics of VRFB.