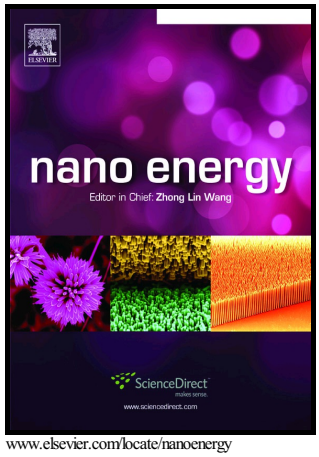

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From Zeolite-type Metal Organic Framework to Porous Nano-sheet Carbon: High Activity Positive Electrode Material for Bromine-based Flow Batteries

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Abstract

A simple and versatile way to synthesize porous nano-sheet carbon (PNSC) with high activity for Br_2/Br^- based on nano-sheet zeolite-type metal organic framework (NSZIF) was presented. The NSZIF was prepared by directly stirring an aqueous solution at room temperature, which avoided the usage of organic solvent and huge energy consumption. The PNSC was prepared by pyrolyzing NSZIF, which inherited a nano-sheet morphology and created a well-defined electron conductive framework. In the design, the nano-sheet morphology shortens the electron transport path and increases electronic conductivity. The in-plane nanopores and highly porous loose structure created by CO_2 activation provide 3D transport channels and substantially enhance the ion diffusion rate within the framework. And the high specific surface area (~2085 $m^2\ g^{-1}$) provides more reactive sites and ensures excellent activity. As a result, the zinc bromine flow battery with PNSC exhibited a voltage efficiency of 83% and an energy efficiency of 82% at a current density of 80 mA cm^{-2}. This paper provided a