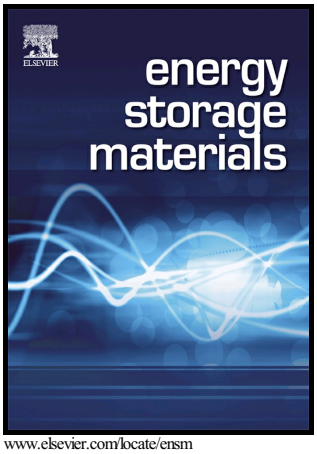

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A Novel Zinc-Ion Hybrid Supercapacitor for Long-Life and Low-Cost Energy Storage Applications

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ABSTRACT

The development of multivalent cation based rechargeable devices have attracted increased interest because that one mole of multivalent ion can contribute double (for M^{2+}) or triple (for M^{3+}) electrons than monovalent ion (M^{+}). Recently, multivalent cation based battery systems (e.g. Mg^{2+} and Al^{3+} batteries) have been widely investigated, however, less attention were paid on multivalent cation based supercapacitors and especially hybrid supercapacitors. Herein, we demonstrate a Zn-ion based hybrid supercapacitor (Zn-HSC) through directly designing Zn foil as both anode and current collector, and bio-carbon derived porous material as the cathode. The bivalent nature and high abundance of zinc can enable the Zn-HSC to achieve high energy density with low cost. After optimization, this Zn-HSC demonstrated superior electrochemical performances such as high discharge capacitance (170