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A self-healable asymmetric fibered-supercapacitor integrated in self-supported inorganic nanosheets array and conducting polymer electrodes

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Abstract: Due to flexible design and good application potential in wearable electronics, the flexible asymmetric fibered-supercapacitor (AFS) has recently attracted increasing interest. However, practical applications of AFS is still facing challenges such a low flexibility, poor capacitance and physical damage. Here, a self-healable asymmetric fibered-supercapacitor based on PPy//Ni_3S_2 electrodes and self-healing electrolyte is reported. Especially, this inorganic nanosheets and conducting polymer asymmetric electrodes help the device to exhibit a wide potential window of 1.8 V and a high areal capacitance of 5.2 F cm^{-2}, meanwhile, it can exhibit good flexibility and maintain stable capacitance performance under bending and folding state. Interestingly, the AFS can quickly restore its capcaitive performance during all 50 breaking/healing cycles, this goal is achieved by integrating diol-borate in the electrolyte into electrodes by forming hydrogen bonds. All of the above results prove the potential self-healing energy storage devices application of the AFS.

Keywords: PPy; Ni_3S_2; flexible; asymmetric fibered-supercapacitor; self-healing

1. Introduction

In recent years, wearable electronic products such as smart electronic textile devices with excellent stability to prevent mechanical damage have received great

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