

A layer-by-layer assembly method using pen lithography for development of flexible microsupercapacitors with graphene flake/PEDOT nanocomposite electrodes

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Flexible microsupercapacitor(MSC) has been widely investigated because of high demands for portable and wearable electronic devices. Herein, we demonstrate novel concepts for graphene flake/polyethylenedioxythiophene(PEDOT) with layer-by-layer assembled MSC using a pen lithography. The pen lithography is considered as promising technique for flexible MSC because of its simple, variable and low-cost features. In this study, the flexible MSC shows high energy density, power density and volumetric capacitance compared to each layers of graphene flake/PEDOT composite MSCs. As a results, the three layers of graphene flake/PEDOT composite MSC enhanced the maximum energy density of 1.5mW h cm⁻³, a power density of 141W cm⁻³, and a volumetric capacitance of 7.7 F cm⁻³ at a current density of 0.02A cm⁻³. It also shows excellent cycling stability with a capacitance retention of 88% after 2500 times repeated charge-discharge cycles. For confirmed flexibility, the flexible MSC shows good durability with a capacitance change less than about 3.9%.