Three Dimensional Graphene/MnO_2 Film Electrodes for High Performance Supercapacitor

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Here, we demonstrated the rational design of a macroporous 3D embossed-chemically modified graphene (e-CMG) film through an embossing process. The resulting film provides rapid pathways for ion and electron transport, and should have tremendous potential for energy storage applications. In particular, MnO_2/e-CMG prepared by simple deposition of MnO_2 into macropores delivered a two-fold higher specific capacitance than that seen for an e-CMG film. More importantly, the integration of e-CMG and MnO_2/e-CMG films into an asymmetric supercapacitor device enables the combination of high energy density, high power density, high rate capability, and long cycling life. We believe that the general and effective method developed in this study can be applied to other graphene-based energy storage and conversion applications, thereby providing an ideal electrode architecture that shows efficient ion and electron transport.