Physical and chemical modification of graphene for high capacitive energy storage

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Graphene, a one-atom-thick, two-dimensional (2D) sp2 carbon structure, has attracted considerable interest as a next-generation electrode material. This can be attributed to a number of interesting properties of graphene, such as its good mechanical/chemical stability, high electrical/thermal conductivity, and a large surface area (over 2630 m2g-1) due to its high surface-to-volume ratio. The combination of these unique physical and chemical properties means that graphene has significant potential to act as either an electrochemically active material in itself or as a conductive carbon template suitable for use in energy storage devices such as supercapacitors and Li-ion batteries.[1-4] At the same time, metal oxide/graphene nanocomposites are also of considerable interest for electrochemical energy storage applications owing to their outstanding properties. These excellent properties of metal oxide/graphene nanocomposites are generated from synergistic combination of graphene with metal oxide on the nanometer scale.[5-9] In this study, we report on the physical and chemical modification of graphene for energy storage applications.

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