3D Macroporous Graphene architecture for high-performance Energy Storage

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Design and manipulation of efficient and rapid transport pathways for ions and electrons in electrode materials are key issues in the development of power and energy densities of energy storage devices. Here, we report a straightforward and controllable method for three-dimensional (3D) macroporous-embossed CMG papers using sacrificial colloidal particles. The resulting porous CMG papers possess a large surface area, bicontinuous macroporous structure, and excellent mechanical integrity. Such unique properties not only boost ion and electron movement in electrochemical reactions, but also enable the porous CMG papers to serve as a promising 3D skeleton for creation of CMG-based macroporous composite papers combined with various nanoparticles (e.g., Au, Pt, Pd, Co3O4, MnO2, and RuO2). The 3D macroporous CMG paper showed excellent electrochemical performances, making it possible to serve as an advanced electrode material for energy storage devices (supercapacitor and lithium ion battery) than can deliver high performances.