



Three-dimensional graphene capacitor

A lightweight, flexible, and highly efficient energy management strategy is needed for flexible energy-storage devices to meet a rapidly growing demand. Graphene-based flexible supercapacitors are one of the most promising candidates because of their intriguing features. In this report, we describe the use of freestanding, lightweight (0.75 mg/cm²), ...

Advanced three-dimensional graphene (3DG) porous monoliths: design, synthesis methods, and electric double-layer capacitor (EDLC) application. The dual networks are the solid carbon network and the pore cavity network

Figure 1B schematically shows the component parts of the newly designed dielectric capacitor, illustrating that the capacitor consists of the uniquely structured nanoporous AAO membrane as a dielectric and two asymmetrical arrays of CNTs as two opposite electrodes. The arrangement of the interdigital electrodes with each ...

The three-dimensional (3D) network structure of graphenes have been recently highlighted as potential electrode materials of supercapacitors. In this review, ...

Herein, micro-meso-macroporous three-dimensional graphene (MMM-3DG) with a high surface area (1492.8 m² g⁻¹) was fabricated in gram-scale production (>1.0 g per one time) as an effective active material for CDI. ... (EDL) capacitor principle, is operated by an external electrical energy applied between two electrodes where charged ...

In this research, 3-dimensional (3D) graphene/carbon nanotube carpets (G/CNTCs)-based microsupercapacitors (G/CNTCs-MCs) were fabricated in situ on nickel electrodes. The G/CNTCs-MCs show impedance phase angle of -81.5° at a frequency of 120 Hz, comparable to commercial aluminum electrolytic capacitors (AECs) for ...

In this work, three types of CVD-synthesized 3-dimensional graphene, differing in their sp²/sp³ ratio, nitrogen doping content, and oxygen presence, are compared for their electrochemical ...

DOI: 10.1063/5.0177677 Corpus ID: 267368577; Three-dimensional network of graphene for electrochemical capacitors and capacitive deionization @article{Zhu2024ThreedimensionalNO, title={Three-dimensional network of graphene for electrochemical capacitors and capacitive deionization}, author={Hongda Zhu and ...

We successfully synthesized a series of edge-free three-dimensional (3D) graphene materials via CVD of methane on an Al₂O₃ nanoparticle template. The ...

In particular, the supercapacitors using these 3D-GCA electrodes with thicknesses on the order of millimeters display exceptional capacitive retention (ca. 90% from 0.5 to 10 A·h·g⁻¹) and power densities ...



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A simple approach for growing porous electrochemically reduced graphene oxide (pErGO) networks on copper wire, modified with galvanostatically deposited copper foam is demonstrated. The as ...

Graphene-based flexible supercapacitors are one of the most promising candidates because of their intriguing features. In this report, we describe the use of freestanding, lightweight (0.75 mg/cm^2), ultrathin ($<200 \text{ nm}$), ...

This review summarizes the preparation methods of 3D network graphene materials, including techniques like chemical vapor deposition, graphene oxide ...

Integrating three-dimensional graphene/ Fe_3O_4 @C composite and mesoporous $\text{Co}(\text{OH})_2$ nanosheets arrays/graphene foam into a superior asymmetric electrochemical capacitor+ Huanwen Wang, ab Hui Teng Tan, a Huan Yi, c Yu Zhang, a Guilue Guo, a Xuefeng Wang,* c Srinivasan Madhavi * ab and Qingyu Yan * ab

Various unique macroscopic assemblies of graphene can be prepared that cover all "four" dimensions, in the form of quantum dots (0D), wires (1D), films (2D), monoliths (3D), and potentially 4D ...

We report an electrochemical co-deposition method to prepare three-dimensional (3D) porous composites of reduced graphene oxide (rGO) and polyaniline (PANI) with pores vertically oriented on the surfaces of current collectors and used as an electrode material for electrochemical capacitors (ECs). These compo

This review describes how 3-dimensional porous graphene electrodes have been improved recently, from using large area processing techniques to microsupercapacitors. ... their functionalization with different pseudocapacitive and electric double-layer capacitor materials to obtain higher capacitance values will be the topics discussed in this ...

The local electric field and charge distribution in the new capacitors (fig. S2) are simulated using the finite element method [the dielectric constant value of Al_2O_3 is around 9], and the calculated capacitance for a 1-mm-thick membrane can reach up to 9.8 mF/cm^2 , being similar to that of the MIM capacitors .

Integration of graphene with polymers to construct three-dimensional porous graphene/polymer composites (3DGPCs) has attracted considerable attention in the past few years for both fundamental studies and diverse technological applications. With the broad diversity in molecular structures of graphene and polymers via rich chemical ...

Well-constructed single-layer molybdenum disulfide nanorose cross-linked by three dimensional-reduced graphene oxide network for superior water splitting and lithium storage property. Sci. ...

Three-dimensional carbons like 3D graphene, carbon fiber papers or carbon cloth, have attracted considerable



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attentions [6, 26]. Many recently reported 3D carbons are hard to meet the above requirements simultaneously [[27], [28], [29]]. For example, 3D graphene may show high surface area and good conductivity [7]. But it ...

Benefiting from the excellent electrochemical and electrocatalytic effects of Co_3O_4 nanowires, the specific capacitance of graphene foam @ Co_3O_4 nanowires can reach 768 F g^{-1} at a current density of 10 A g^{-1} and increase to around 1150 F g^{-1} ...

In this research, 3-dimensional (3D) graphene/carbon nanotube carpets (G/CNTCs)-based microsupercapacitors (G/CNTCs-MCs) were fabricated in situ on nickel electrodes. The G/CNTCs-MCs show ...

In this work, we developed a facile route to synthesize three-dimensional graphene/carbon nanotube (3DG/CNT) hybrids as electrodes for binder-free electrical double layer capacitor (EDLC) by using ...

Nevertheless, micro-supercapacitors that integrate the advantages of the ultrahigh power density of an electrolytic capacitor ($10^2 - 10^3 \text{ W cm}^{-3}$) and the high-energy delivery of a thin-film ...

We have demonstrated a three-dimensional composite structure of graphene and carbon nanotubes as electrodes for super-capacitors. The goal of this study is to fabricate and test the vertically grown carbon nanotubes on the graphene layer acting as a spacer to avoid self-aggregation of the graphene layers while realizing high active ...

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