



# Graphene electrode perovskite battery

Reasonable design and applications of graphene-based materials are supposed to be promising ways to tackle many fundamental problems emerging in lithium batteries, ...

This made it possible to include the synthesized graphene in lithium-ion batteries (LIB) electrodes as a conductive ... This approach led to a four-terminal perovskite/graphene-silicon tandem solar cell with an efficiency of 20.37 %, highlighting the potential of low-temperature-processed tandem devices for practical applications with ...

Integrating perovskite photovoltaics with other systems can substantially improve their performance. This Review discusses various integrated perovskite devices for applications including tandem ...

Recently, rechargeable Zn-air batteries (ZABs) have attracted widespread interest as a renewable energy technology for their unique properties, including superior energy density ( $1370 \text{ W h kg}^{-1}$ ), high power density, safety, reliability and low cost. [14], [15], [16] Nevertheless, rechargeable ZABs suffer from sluggish oxygen reduction reaction (ORR,  $\text{O}_2 + \dots$ )

Moreover, graphene/perovskite solar cells show higher stability with respect to conventional perovskite solar cells, demonstrating the central role of graphene-modified interfaces to inhibit aging ...

In this study, a  $\text{SrCoO}_3$  perovskite catalyst is prepared by sol-gel method, and modified by loading graphene and doping Mn. The effects of 20% graphene loading and 50% Mn doping on the performance of  $\text{SrCoO}_3$  perovskite as a cathode catalyst for Al-air battery are studied by morphology observation, electrochemical performance analysis, and full battery test.

Durability of S- and N-doped graphene nanoplatelets for electrode performance in solid-state batteries. Vijay Kumar Srivastava a, Stefanos Mourdikoudis \* bd, Jalal Azadmanjiri \* b, Parshant Kumar c and Zdeněk Šofer \* b a Department of Mechanical Engineering, Indian Institute of Technology (BHU), Varanasi-221005, India b Department of Inorganic Chemistry, ...

To give a complete picture on the use of graphene as electrode in perovskite solar cells, we finally discuss the demonstration, reported by Yan and coworkers in 2015 [111], of a HTM-free perovskite device based on single-layered (SG) and multilayered (MG) graphene electrode for hole extraction. The objective of this work was to demonstrate efficient devices ...

i) Schematic presentation of perovskite as an electrode for Li-ion batteries, and ii) 2D/3D perovskite with varied halides for battery applications. Perovskites offer higher ...

$\text{AFeO}_3$ -based perovskite/graphene composite was prepared using microwave-assisted method.. Cs in the order:  $\text{Sr}_2\text{Fe}_2\text{O}_5$  >  $\text{LaFeO}_3$  >  $\text{SmFeO}_3$  >  $\text{NdFeO}_3$ ; due to differences in A-atom and Fe%.. Cs



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was enhanced by the addition of  $K_3[Fe(CN)_6]$  to KOH electrolyte the value is  $675.1 \text{ C.g}^{-1}$ .  $AFeO_3$  are crystalline; particle sizes are  $5.7 \dots$

A new class of transparent graphene electrode based organic-inorganic halide perovskite photodetectors with broad spectral response is developed. These ultrasensitive devices exhibit high ON/OFF current ratio, high linear dynamic range, broad spectral range, excellent detection for weak light and easy fabrication with low-cost. Their semi-transparent ...

Carbon electrode-based perovskite solar cells require a high-quality interface between the hole transport layer and the electrode. Here, lamination using an isostatic press is used to form this ...

Here we demonstrate highly efficient and reliable super flexible perovskite solar cells using graphene as a transparent electrode. The device performance reaches 16.8% with no hysteresis comparable to that of the counterpart ...

Reasonable design and applications of graphene-based materials are supposed to be promising ways to tackle many fundamental problems emerging in lithium batteries, including suppression of electrode/electrolyte side reactions, stabilization of electrode architecture, and improvement of conductive component. Therefore, extensive fundamental ...

Here, we review the use of graphene and graphene-derived nanomaterials in new designs of perovskite solar cells associated with organic-inorganic metal halide perovskites utilized as light ...

The electrochemical performance of graphene oxide, synthesized from lead graphite-based materials as electrodes for supercapacitors, was studied in 2-M KOH solution using a three-electrode system to investigate the advantages of graphene. The current collector is nickel foam, and the electrode fabrication is done with the help of a doctor blade method. ...

Gold. Gold as a noble metal has been one of the most common and effective electrode materials for high-performance perovskite devices to date. Its work function is also well matched with the common HTLs, CuSCN or Spiro-OMeTAD, or NiOx. The maximum efficiency PSC with  $\eta = 25.2\%$  has been reported using 100 nm of Au electrode deposited ...

Researchers utilized graphene as a transparent carbon electrode in inverted flexible perovskite solar cells, and compared its performance to that of indium tin oxide and ...

This study presents recent developments in applying graphene-based materials in electrodes, perovskite active layers, charge transport layers, and encapsulation layers of PSCs, focusing particularly on breakthroughs achieved ...

Since the last decade, PSCs (perovskite solar cells) have been showing significant growth in power conversion



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efficiency (PCE). These cells have recorded a remarkable rise in PCE from 3.8% to 25.2% in a very short duration as compared to other technologies []. Apart from this, the perovskite materials have attracted keen attention from researchers ...

Researchers at The Hong Kong Polytechnic University (PolyU) have developed efficient and low-cost semitransparent perovskite solar cells with graphene electrodes. The power conversion efficiencies (PCEs) of this ...

Incorporation of graphene, or graphene oxide (GO), with CuO during electrode preparation has been found to increase the stable capacity and the cycling stability of the electrodes, although the reasons for this ...

This work shows the feasibility of using metal arrays as electrodes in perovskite batteries, which is also an important support for the project. This is not available with traditional electrodes. Thirdly, due to the thin thickness of graphene, the metal array at this time can play both the far-field scattering and near-field enhancement effects ...

Flexible perovskite solar cells (FPSCs) have attracted enormous interest in wearable and portable electronics due to their high power-per-weight and low cost. Flexible and efficient perovskite solar cells require the development of flexible electrodes compatible with the optoelectronic properties of perovskite. In this review, the recent progress of flexible ...

Recent studies [18,23] indicate that the lithium insertion into hybrid perovskites can be broken down into three main processes, which are summarised below. All subsequent potentials herein are with reference to the Li/Li<sup>+</sup> redox couple. (I) Between 2.1 V and 1.5 V, lithium ion insertion into the perovskite structure takes place, with charge compensation by the reduction of the Pb<sup>2+</sup> ...

We develop a model to determine the required sheet resistance of a graphene TCE with 97% transmittance in a perovskite/silicon tandem cell. As the technique here reported does not impact transmittance, a graphene ...

A conventional three-electrode battery system was used, in which the glassy carbon rotating disk electrode (RDE) coated with catalyst ink was used as the working electrode, the carbon rod as the counter electrode, Ag/AgCl as the reference electrode, and the electrolyte was 0.1 M KOH solution. In order to prepare catalyst ink, LSCF@rGO catalyst (5.0 mg), carbon ...

The raw material for the electrode was synthesized using a ZnMnO<sub>3</sub> composite with reduced graphene oxide (rGO) for electrochemical characterization. The composite of ...

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