

Although there are literature reviews on phosphorus published in the context of energy storage and conversion applications, including, black phosphorus [19-21], phosphorus-based mesoporous materials, and elemental phosphorus, there is yet to be a comprehensive and methodical review of phosphorus-based nanomaterials in the same context. In this ...

exploitation of renewable and clean energy (e.g., wind, solar, tidal, geothermal and biomass energy) and the rapid development of energy storage and conversion technologies (e.g., supercapacitors, rechargeable batteries, and fuel cells) [1-4]. These sustainable energy storage and conversion devices (ESCDs) not only reduce the detrimental

Black phosphorus (BP) is a thermodynamically stable two-dimensional semiconductor material, and its applications in the fields of optoelectronic devices [1], biomedicine [2], catalysis [3] and energy storage [4], [5], [6] have attracted more and more attention. Three phase structures of BP have been found: cubic, orthorhombic, rhombohedral.

Two-dimensional black phosphorus (2D BP), well known as phosphorene, has triggered tremendous attention since the first discovery in 2014. The unique puckered monolayer structure endows 2D BP intriguing properties, which facilitate its potential applications in various fields, such as catalyst, energy storage, sensor, etc. Owing to the large surface area, good ...

PDF | On Jan 1, 2024, Tooba Akram and others published Insight into two-dimensional black phosphorus: An emerging energy storage material | Find, read and cite all the research you need on ...

Two-dimensional (2D) mesoporous materials (2DMMs), defined as 2D nanosheets with randomly dispersed or orderly aligned mesopores of 2-50 nm, can synergistically combine the fascinating merits of 2D materials and mesoporous materials, while overcoming their intrinsic shortcomings, e.g., easy self-stacking of 2D materials and long ion transport paths in ...

The polymorphism of phosphorus-based materials has garnered much research interest, and the variable chemical bonding structures give rise to a variety of micro and nanostructures. Among the different types of materials containing phosphorus, elemental phosphorus materials (EPMs) constitute the foundation for the synthesis of related compounds.

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The individual layers of bulk BP can be mechanically exfoliated down to monolayers, similar to graphene from graphite. At normal conditions, the bulk BP structure is orthorhombic with space group Cmca. The crystal structure is shown in Figure 3 a. 37 Each phosphorus atom is bonded to three neighboring atoms through sp^3 -hybridized orbitals, ...

Phosphorus in energy storage has received widespread attention in recent years. Both the high specific capacity and ion mobility of phosphorus may lead to a breakthrough in energy storage materials. Black ...

Red phosphorus (RP) is a promising anode material for use in lithium-ion batteries (LIBs) due to its high theoretical specific capacity (2596 mA h g⁻¹). However, the practical use of RP-based anodes has been challenged by the material's low intrinsic electrical conductivity and poor structural stability during lithiation. Here, we describe a phosphorus ...

Black phosphorus (BP) is a type of relatively novel and promising material with some outstanding properties, such as its theoretical specific capacity (2596 mAh/g) being approximately seven times larger than that of graphite as a negative material for batteries. Phosphorene, a one-layer or several-layer BP, is a type of two-dimensional material. BP, ...

2D metal phosphorous trichalcogenides (MPCh 3) have attracted considerable attention in sustainable energy storage and conversion due to their distinct physical and chemical characteristics, such as adjustable ...

Indian Journal of Science and Technology, 2017. In the recent times, two dimensional layered single crystals attracted huge attention to their tunable mechanical, optical and electronic properties which have potential applications ...

The polymorphism of phosphorus-based materials has garnered much research interest, and the variable chemical bonding structures give rise to a variety of micro and nanostructures.

In the present research, for the first time, we propose a new 3D porous phosphorus carbide (3D-PC 6) using imidazole graphyne (ID-GY) [18] layers as a basic building unit in which nitrogen atoms are substituted with phosphorus for repeating these layers in c-direction. The resulting structure is dynamically, thermally, and energetically stable and shows ...

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