

Can boron nitride nanosheets improve high-temperature performance of composite films?

In this work, hybrid assembly engineering is proposed to design composite films with a new polymer of poly (acrylonitrile butadiene styrene) (ABS) as the matrix, boron nitride nanosheets (BNNS) and Na_{0.5}Bi_{0.5}TiO₃-Sr_{0.7}Bi_{0.2}TiO₃ (NBT-SBT) as two different fillers to improve high-temperature performance.

Does boron nitride improve energy storage performance of polymer dielectric film?

Aiming at the main problem of drastically degraded of energy storage performance caused by the sharp increase of leakage current of polymer dielectric film at high temperature, the energy storage performance of PI at 150 °C is improved by embedding boron nitride intermediate layer in PI.

Does boron nitride interlayer increase energy storage density at high temperature?

The experiment results indicate that a small amount of boron nitride interlayer can increase the E_b and suppress leakage current, leading to significant increase in energy storage density at high temperature.

Are boron nitride reinforced polyimide-based nanocomposites suitable for high-temperature energy storage?

Researchers and industries have accomplished some advancements in the development of boron nitride reinforced polyimide-based nanocomposite materials for high-temperature energy storage.

Can boron nitride nanosheets be used for thermal management?

Dielectric properties and thermal management capability were concurrently improved. Currently, massive preparation of boron nitride nanosheets (BNNSs) towards large-size and good structural integrity via ball milling remains a key challenge, limiting its extensive applications in thermal management and energy storage.

Can boron nitride fillers enhance polyimide-based nanocomposite properties?

The present study reviewed the recent advances on the enhancement of polyimide-based nanocomposite properties using boron nitride fillers for high-temperature energy storage.

Furthermore, the gel electrolytes demonstrated exceptional thermal stability, enabling high-temperature battery operation up to 175 °C. The study establishes exfoliated hBN ionic liquid gels as a promising solid-state ...

Cellulose molecules serve as a stabilizer for exfoliated boron nitride nanosheet (BNNS) and provide the nanocomposites with a high dielectric constant, while BNNS significantly improves their breakdown voltage. Here, 10 wt % of BNNS ...

Paraelectric ceramic ST has a considerable dielectric constant (~17) and low residual polarization [36], which can improve the energy storage density of composite materials while ensuring high energy conversion efficiency. Boron nitride nanosheets with a wide band gap have high breakdown strength and can curtail

carrier migration [37 ...

The experiment results indicate that a small amount of boron nitride interlayer can increase the E b and suppress leakage current, leading ...

In a 2019 study, researchers addressed challenges in lithium-ion battery technology by developing high-modulus, ion-conductive gel electrolytes using exfoliated hexagonal boron nitride (hBN) nanoplatelets and imidazolium ...

Li et al. obtained nanocomposites by doping boron nitride nanosheets (BNNS) as ... C. et al. Improved capacitive energy storage at high temperature via constructing physical cross-link and ...

The further electrification of various fields in production and daily life makes it a topic worthy of exploration to improve the performance of capacitors for a long time, including thin-film capacitors. The discharge energy density of ...

The progress of novel, low-cost, and environmentally friendly energy conversion and storage systems has been instrumental in driving the green and low-carbon transformation of the energy sector [1]. Among the key components of advanced electronic and power systems, polymer dielectrics stand out due to their inherent high-power density, fast charge-discharge ...

The optimization of high-temperature polymer capacitors is critical to the development of power electronics in harsh environments. The conduction loss of polymers increases dramatically at high temperatures, leading to a decrease in energy density and charge/discharge efficiency, which is a major impediment for capacitor applications.

High temperature and high rate lithium-ion batteries with boron nitride nanotubes coated polypropylene separators Energy Storage Materials (IF 18.9) Pub Date : 2019-04-01, DOI: 10.1016/j.ensm.2019.03.027

The addition of boron nitride nanosheets to polymer nanocomposites creates dielectric materials that operate at much higher working temperatures than previous polymer dielectrics, as well as being ...

X. Li, H. Luo, C. Yang et al., Enhancing high-temperature energy storage performance of PEI-based dielectrics by incorporating ZIF-67 with a narrow bandgap. ACS Appl. Mater. ... Y. Zhou, J. Hu et al., Polyimide films coated by magnetron sputtered boron nitride for high-temperature capacitor dielectrics. IEEE Trans. Dielectr. Electr. Insul ...

Dielectric energy storage capacitors with ultrafast charging-discharging rates are indispensable for the development of the electronics industry and electric power systems 1,2,3. However, their low ...

Improving high-temperature energy storage performance of PI dielectric capacitor films through boron nitride interlayer Advanced Composites and Hybrid Materials., 5 (2021), pp. 238 - 249, 10.1007/s42114-021-00329-7

With the evolution of electronic industry, the increasing demand for lightweight, flexible and high-performance energy storage materials have facilitated the development of electrical energy storage and conversion technologies [1], [2]. Dielectric capacitors are basic components in electric systems because of their fast charge-discharge capability to offer high ...

Hexagonal Boron Nitride structures with diverse topologies, particularly tubular structures, were used to achieve high hydrogen storage at room temperature. Hexagonal Boron Nitride structures, including hollow spheres with ultra-thin shells, collapsed nanotubes, nanofibers, bamboo-like nanotubes and porous whiskers with micropores or ...

Several high temperature resistant polymers with high glass transition temperatures ($T_g > 200 \text{ }^\circ\text{C}$) were considered as candidates for high-temperature polymer dielectrics, including polyamide (PAI), polyimide (PI) and polyetherimide (PEI) [9, 10]. However, the energy storage performances of these polymers degrade dramatically at high ...

Polymer dielectrics with high energy density (ED) and excellent thermal resistance (TR) have attracted increasing attention with miniaturization and integration of electronic devices. However, most polymers are not adequate to meet these requirements due to their organic skeleton and low dielectric constant.

Enhancement of high-temperature dielectric energy storage performances of polyimide nanocomposites utilizing surface functionalized MAX nanosheets. ... Recent progress in polymer dielectrics containing boron nitride nanosheets for high energy density capacitors. High Volt., 5 (4) (2020), pp. 365-376. Crossref View in Scopus Google Scholar

These findings highlight that STBG1 is a promising composite with high capacitance, strong rate capability, and exceptional coulombic efficiency, making it a viable ...

Improving high-temperature energy storage performance of PI dielectric capacitor films through boron nitride Advanced Composites and Hybrid Materials (IF 23.2) Pub Date : 2021-08-23, DOI: 10.

With the electronic products trending towards lightweight, miniaturized, and integrated, there is an urgent demand to develop high-performance dielectric materials with characteristics such as superior breakdown strength, high dielectric constants, outstanding processing performance, high thermal stability and low dielectric losses.

Thus, the paper covers the overview of boron nitride as inorganic fillers, the effects of BN nanofillers

reinforcement on the performance of PI-based nanocomposites for high ...

Afterwards, the high density of structural defects like boron or nitrogen vacancies, sheet dislocations and unsaturated edge area, provide more active sites for the adsorption which consequently enhance the hydrogen chemisorption of the h-BNNS than the original surface [23] was shown through detailed simulations that the hydrogen binding properties of ...

High energy storage density and efficiency in aligned nanofiber filled nanocomposites with multilayer structure. Compos Part B Eng, 198 (2020), ... Flexible regenerated cellulose/boron nitride nanosheet high-temperature dielectric nanocomposite films with high energy density and breakdown strength. ACS Sustain Chem Eng, 6 (5) (2018) ...

In this paper, through the co-doped of insulating boron nitride (BNNS) and polarized titanium dioxide (TiO₂) two-dimensional nanosheets, the polarization strength is enhanced, and the breakdown strength can maintain at a high level, then an excellent energy storage density of 20.08J/cm³ and charge-discharge efficiency of 73 % are obtained ...

In this study, boron nitride nanotubes (BNNTs) are synthesized and used for the first time as a new type of high performance inorganic nanomaterials to prevent short-circuit.

Dielectric, insulating and energy-storage performance at 150 °C of the resultant composite films were investigated. The experimental results showed that a dense layer of hexagonal boron nitride (h-BN) was formed on the surface of the polyimide and the coating layer could effectively suppress the charge injection at the electrode/dielectric ...

In recent years, polymer-based dielectric capacitors have attracted much more attention due to the advantages of excellent flexibility, light weight, and high power density. However, most studies focus on energy storage performances ...

The present study reviewed the recent advances on the enhancement of polyimide-based nanocomposite properties using boron nitride fillers for high-temperature ...

Improving energy storage density and efficiency of polymer dielectrics by adding trace biomimetic lysozyme-modified boron nitride. ... Scalable self-assembly interfacial engineering for high-temperature dielectric energy storage. IScience, 25 (2022), Article 104601, 10.1016/j.isci.2022.104601. View PDF View article View in Scopus Google Scholar ...

In this work, hybrid assembly engineering is proposed to design composite films with a new polymer of poly (acrylonitrile butadiene styrene) (ABS) as the matrix, boron nitride ...

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