

What are the recent developments in high-temperature energy storage polymer dielectrics?

Recent progress in the field of high-temperature energy storage polymer dielectrics is summarized and discussed, including the discovery of wide bandgap, high-glass transition temperature polymers, the design of organic/inorganic hybrid nanocomposites, and the development of thin dielectric films with hierarchical nanostructures.

Which polymer is best for electrostatic energy storage?

Our approach revealed PONB-2Me5Cl, an exceptional polymer for electrostatic energy storage, especially in high-temperature applications such as wind pitch control, hybrid vehicles and rail, and pulsed power systems. A handful of other prospective dielectrics in the polyVERSE database, including some with green profiles, are recommended.

Can ladderphane copolymers be used for high-temperature capacitive energy storage?

Chen, J. et al. Ladderphane copolymers for high-temperature capacitive energy storage. *Nature* 615, 62-66 (2023). Wang, R. et al. Designing tailored combinations of structural units in polymer dielectrics for high-temperature capacitive energy storage.

Are flexible laminated polymer nanocomposites good for energy storage?

Flexible laminated polymer nanocomposites with the polymer layer confined are found to exhibit enhanced thermal stability and improved high-temperature energy storage capabilities.

Are high-temperature polymers heat resistant?

Based on this, both common and latest research results high-temperature polymers are summarized and classified into different material insulation heat-resistant grades according to the reported operating temperature and the current national standard heat resistance grades.

Why do high-temperature polymers have strong dielectric properties?

Recent studies have witnessed that when polymers have a high T_m or T_g , they usually display a great high-temperature resistance and hence a strong temperature independence of dielectric properties. Dielectric properties of commercial high-temperature polymer dielectrics.

However, current high- T_g polymers have limitations, and it is difficult to meet the demand for high-temperature energy storage dielectrics with only one polymer. For example, polyetherimide has high-energy storage efficiency, but low ...

Polymer dielectrics for high-temperature capacitive energy storage suffer from low discharge energy density and inferior efficiency owing to their exponential growth of ...

The specific crosslinking networks in the designed polar polymer blends balance significantly the electrical, and thermal properties of high-performance polymer dielectrics, ...

Improved high-temperature energy storage of polyetherimide by energy level structure regulation. Author links open overlay panel Mengyu Xiao a ... improving the rotational ...

Obviously, the t-BPB-8 composite film is significantly superior in both energy density and charge/discharge efficiency. It is further revealed that the trilayer composite film ...

Dielectric film capacitors for high-temperature energy storage applications have shown great potential in modern electronic and electrical systems, such as aircraft, automotive, oil exploration industry, and so on, in which polymers are ...

Abstract Polymer dielectrics have broad applications in advanced electronics and power systems. ... Hopefully, these nanofibers not only serve as excellent nanofillers for ...

As such, the c-BCB/BNNS composites outperform the other high-temperature polymer dielectrics with a record high-temperature capacitive energy storage capability (i.e., breakdown strength of 403 MV/m and a ...

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