

# Polyimide capacitors

Can polyimide be used as a dielectric capacitor?

Dielectric capacitors with a high operating temperature applied in electric vehicles, aerospace and underground exploration require dielectric materials with high temperature resistance and high energy density. Polyimide (PI) turns out to be a potential dielectric material for capacitor applications at high temperatures.

Can polyimides be used for film capacitors at high temperature?

The blending polyimides films possess high permittivity up to 7.9, low dielectric loss below 0.08, and a maximum energy density of  $2.87 \times 10^{-3} \text{ J cm}^{-3}$ . Meantime, the polyimides possess excellent mechanical property and excellent thermal stability. These obtained polyimide blends can be used for film capacitors at high temperature. 2 Experimental

Are alicyclic polyimides suitable for capacitor energy storage?

In general, polyimides with an alicyclic structure were successfully prepared for capacitor energy storage at elevated temperatures. The semi-aromatic PI not only maintains the high temperature resistance, but also weakens the long distance conjugation effect of the main chain and possesses a wide band gap.

Can polyimide be used for capacitor energy storage?

Polyimide with an alicyclic structure was prepared for capacitor energy storage. High bandgap width and weak charge transfer complex improve energy storage property. Conductive and breakdown mechanism were investigated at high temperature. Discharge energy density of  $4.63 \text{ J cm}^{-3}$  was obtained at room temperature.

Are Aromatic polyimides a good capacitor dielectric?

Demands on these criteria are even more stringent in growing numbers of applications demanding high power performance. Aromatic polyimides, though not a panacea, are a class of heat-resistant polymers of great interest to researchers as capacitor dielectrics because of good thermal and mechanical stability.

Are polymer film capacitors suitable for high-temperature applications?

Abstract Polymer film capacitors do not meet the increasing demand of high-temperature ( $> 125 \times 10^3 \text{ C}$ ) applications with the rapid development of new energy. In particular, few polymer dielectrics can operate at high temperatures ( $> 250 \times 10^3 \text{ C}$ ).

Polyimides have garnered attention as promising dielectric materials for high ...

This chapter discusses the important criteria for high temperature polymer ...

In summary, we have successfully substantiated that polyimide-based ...

Specifically, the polyimide (SPI-1) with sulfonyl group in diamine moiety and para-para linkage shows stable

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dielectric properties up to 150 °C, and the discharged energy density and charge-discharge efficiency can be as ...

Polyimide (PI) dielectrics have attracted much attention in the field of film capacitors because of outstanding high temperature resistance, well film-forming and mechanical properties. However, high conductive loss leads to low energy density and efficiency at elevated temperatures, which is caused by the conjugation effect of the ...

Polymer film capacitors do not meet the increasing demand of high ...

Here, a modularized molecular engineering strategy is reported to enhance the high-temperature capacitive performance of polymer dielectrics. First, the potential influences of multiple structural units on  $\epsilon_r$ ,  $T_g$ , ...

Polyimides have garnered attention as promising dielectric materials for high-temperature film capacitors due to their exceptional heat resistance. However, conventional polyimides with narrow bandgaps suffer from significant conduction loss at high temperatures and high electric fields.

capacitor dielectrics and presents a comprehensive review on commercial resin development up to recent research progress on polyimide (PI) targeted for operating temperature above 150 °C. While many review articles on various aspects of polymeric capacitor dielectrics are available [25-32], this chapter has a specific

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Dielectric capacitors with a high operating temperature applied in electric vehicles, aerospace and underground exploration require dielectric materials with high temperature resistance and high energy density. Polyimide ...

In summary, we have successfully substantiated that polyimide-based composite with a crosslinking structure exhibits a significantly enhanced high-temperature capacitance performance, outperforming the currently reported dielectric polymers with a single strategy. More importantly, we have deeply explored the rationality of the ...

Polyimide (PI) dielectrics have attracted much attention in the field of film ...

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Polyimide (PI) turns out to be a potential dielectric material for capacitor applications at high temperatures. In this review, the key parameters related to high temperature resistance and energy storage characteristics ...

Here, a modularized molecular engineering strategy is reported to enhance the high-temperature capacitive performance of polymer dielectrics. First, the potential influences of multiple structural units on  $\epsilon_r$ ,  $T_g$ , and  $E_g$  of polymers are elucidated by comparing a set of polyimides (PIs).

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