Polyurethane dielectric energy storage

Which plasticizers are used in thermoplastic polyurethane?
Thermoplastic polyurethane (PU) with high relative permittivity (~8) was chosen as the elastic matrix. Barium titanate (BT) nanoparticles and dibutyl phthalate (DBP)plasticizers,which were selected to improve the permittivity and mechanical properties,respectively,were blended into the PU matrix.

Can polyurethane-based ternary composites harvest electric energy?
The lack of ideal dielectric elastomers,after nearly two decades of research,has become the bottleneck for DEGs' practical applications. Here,we fabricated a series of polyurethane-based ternary composites and estimated their potential as DEGs to harvest electric energyfor the first time.

Who are the authors of advanced dielectric elastomer based on acrylate and polyurethane?
Yu Zhao,Jun-Wei Zha,Li-Juan Yin,Sheng-Tao Li,Yong-Qiang Wen,Zhi-Min Dang. Constructing advanced dielectric elastomer based on copolymer of acrylate and polyurethane with large actuation strain at low electric field.

Why do we need dielectric capacitors for continuous miniaturization of electronic devices?
The continuous miniaturization of electronic devices and electric equipment requires high energy-storable dielectric capacitors. Therefore, seeking dielectric m

Can modified silica reduce the elastic modulus of polyurethane?
A novel and straightforward approach was employed to augment the dielectric constant and diminish the elastic modulus of polyurethane (PU) through the integration of modified silica (NSiO 2) into the matrix.

What is a rational balance between mechanical and dielectric properties?
In general, it is necessary to establish a rational balance between the mechanical and dielectric properties, which is of substantial importance in the practical application of the DE. Silica (SiO 2) is a highly versatile reinforcing filler that can greatly enhance the mechanical properties of elastomeric composites.

Dielectric energy storage ceramics have become a research frontier in the field of materials and chemistry in recent years, because of their high power density, ultra-fast charge ...

With the growing demand for miniaturized and flexible electronic devices, exploring polymer-based materials with high dielectric properties will play a crucial role in high ...

For instance, Pu et al. [23] reported that the grain boundary resistance could be significantly increased by O 2 annealing while the grain resistance hardly changed, ... while ...

(1-x)SrTiO 3-x(Na 0.5 Bi 0.5)TiO 3 ((1-x)ST-xNBT) ceramics have been prepared by solid-state route and their structure, electric and energy storage properties have been ...

Polyurethane dielectric energy storage

Electrostatic dielectric capacitors with ultrahigh power densities are sought after for advanced electronic and electrical systems owing to their ultrafast charge-discharge capability. However, low energy density resulting from low ...

In the experimental studies, the dielectric properties of polyurethane dielectric materials such as capacitance and loss coefficient are examined and the insulation qualities ...

BaTiO3 Nanoparticles Coated with Polyurethane and SiO2 for Enhanced Dielectric Properties. ACS Applied Nano Materials 2023, 6 (4), ... Recent progress in polymer dielectric energy storage: From film fabrication ...

The continuous miniaturization of electronic devices and electric equipment requires high energy-storable dielectric capacitors. Therefore, seeking dielectric m

Polymer composites are suitable strategies for the development of advanced materials with tailored electrical properties, particularly relevant in electronics areas such as sensors, actuators, and solid electrolytes for energy storage ...

In recent years, researchers used to enhance the energy storage performance of dielectrics mainly by increasing the dielectric constant. [22, 43] As the research progressed, the bottleneck of this method was revealed. []Due to the different ...

227,Nature?Nature Communications?202516"Enhanced energy storage performance of nano-submicron structural dielectric films by suppressed ferroelectric phase aggregation (...

Research on polymer-based dielectric materials with low energy loss and high power density for dielectric capacitors can promote the development of advanced energy ...

This contribution offers a feasible idea to explore reliable dielectric capacitors at high temperature. 2D Hybrid structure polymer nanocomposites exhibit remarkable capacitive ...

The energy-storage density (W d) and energy efficiency (i) were depicted in Fig. 5 (b) according to following: (4) W d = ? P r p m E d P Where P m, P r and E are high maximum ...

Graphene/Boron Nitride-Polyurethane Microlaminates for Exceptional Dielectric Properties and High Energy Densities ACS Applied Materials & Interfaces (IF 8.3) Pub Date : ...

[1] Khanchaitit P, Han K, Gadinski M R, Li Q and Wang Q 2013 Ferroelectric polymer networks with high energy density and improved discharged efficiency for dielectric ...

Polymer-based dielectric capacitors are widely-used energy storage devices. However, although the functions

of dielectrics in applications like high-voltage direct current ...

Among various dielectric materials, polymers have remarkable advantages for energy storage, such as superior breakdown strength (E b) for high-voltage operation, low ...

In this study, a polyurethane material (PU-S x) with excellent tensile and dielectric properties was prepared by introducing the aromatic disulfide 2,2"-Diaminodiphenyl disulphide ...

The Dielectric constant was found to be clearly increased with the increasing volume fraction of Aluminum. A comparison of piezo- and ferroelectric activities between ...

In order to find the constitutive relationship of mechanical properties suitable for polyurethane dielectric elastomer, the constitutive model of dielectric elastomer based on ...

In this paper, barium titanate nanoparticles (BaTiO3, BT) were incorporated into the polyurethane (TPU) matrix to prepare dielectric elastomer composites. Then, the ...

Benefiting from the characteristics of large power density, superior cycle stability and excellent charge-discharge capability, Eco-friendly ceramic dielectric capacitors are ...

The next-generation capacitors have placed higher requirements on energy-storage dielectrics, such as high temperature, high frequency and high voltage.Perovskite dielectrics ...

However, two typical difficulties exist in order to achieve high-energy storage polymer/BaTiO 3 nanocomposites. Firstly, obvious aggregation of BaTiO 3 nanoparticles can ...

In addition, the dielectric energy storage performances of PI based nanocomposites at high temperature were further investigated. Compared with the tested results at room ...

Asymmetric Trilayer all-polymer dielectric composites with simultaneous high efficiency and high energy density: a novel design targeting for advanced energy storage ...

The composites PUA/MOF/IL underwent characterization through electron microscopy for morphology analysis, X-ray diffraction (XRS) and Fourier transform infrared spectroscopy (FTIR) for the determination of the ...

Dielectric polymers have been broadly applied in film energy storage capacitors owing to their excellent insulating characteristics. However, low electric displacement () and ...

The obtained composite films were subsequently fixed in the mould for the electromechanical conversion experiment and the elastomer device exhibited significantly ...

Polyurethane dielectric energy storage

Capacitor is widely used as energy storage equipment in modern society because of its excellent energy storage performance [1], [2] pared to chemical batteries and super ...

As a typical linear dielectric, SrTiO 3 ceramic possess relatively high permittivity (~300) and breakdown strength (80-200 kV/cm). Thus, effective stragties have been taken to ...

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