Amorphous thin film energy storage

Why do amorphous materials have a high energy storage density?
Although the dielectric constant of amorphous materials is lower than that of crystalline materials,a high energy storage density can be expected because of the greatly enhanced breakdown strength.

Can flexible amorphous thin film energy harvester be used for electromechanical energy harvesting?
Traditional methods to incorporate polycrystalline thin film into flexible systems are often complicated and limited by their sizes. Here,the authors introduce flexible amorphous thin film energy harvester,based on perovskite oxides,on a plastic substrate for electromechanical energy harvesting.

How can nanocomposite film achieve high energy storage density?
The nanocomposite film with t local nanocrystalline structures and amorphous matrix coexistingis very effective in achieving high energy storage density. It can be easily fabricated by sol-gel method at low temperature heat treatment (600 ~ 700 °C) followed by rapid annealing.

What is the output voltage of Poling amorphous thin films?
As optimal harvesting outcomes with poling,an output voltage of 38.7 V,power of 413 uW,and power density of 2.8 × 10 6 uW cm -3 were attained for nearly stoichiometric amorphous thin films processed with the highest oxygen pressure.

What is the energy-harvesting performance of polycrystalline-oxide-thin-film cantilevers?
The energy-harvesting performance was excellentdespite the amorphous nature of the thin films; peak output values of ~38.7 V,~413 uW,and ~2.8 × 10 6 uW cm -3 which are the record-high values among reported energy-harvesting devices based on typical polycrystalline-oxide-thin-film cantilevers utilizing mechanical vibrations.

What is the power density of polycrystalline ferroelectric oxide thin-film cantilevers?
Surprisingly,the resultant amorphous nature of the films results in an output voltage and power density of ~38.7 V and ~2.8 × 10 6 uW cm -3,respectively,which break the previously reported record for typical polycrystalline ferroelectric oxide thin-film cantilevers.

In the field of stored energy materials, lead-free amorphous thin films have the advantages of high breakdown strength, excellent stability, environmental protection and ...

Improving energy storage density and efficiency is the ultimate goal of dielectric materials used in ceramic capacitors. Among different dielectric materials, dielectrics in thin film ...

However, the difficulty of simultaneous optimization of polarization and breakdown strength has always been a difficulty in improving the energy storage properties of ...

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Enhancement of energy storage performance in PLZT/PLZ heterostructured thin films via an amorphous Al2O3 interfacial layer Jianing Zhu a b c, Jia He a b c, Piyu Gong a b c, Fuling ...

Amorphous thin films have been widely studied due to the excellent breakdown strength in recent years. However, their practical application faces significant challenges ...

High-entropy amorphous thin film has characteristics of both high-entropy alloys and amorphous alloys, thus exhibiting many excellent properties, which have attracted ...

Abstract Amorphous thin films with high power density and breakdown strength satisfy the needs of advanced power electronic systems. Nonetheless, improving the energy storage density of ...

The film can maintain a high energy storage density after 10 6 cycles, and the change rate of the discharge energy storage density is less than 1%, indicating that the film ...

Therefore, further research is conducted on the effect of amorphous nanocrystalline composites on the hydrogen storage performance of Mg based amorphous ...

Electrostatic capacitors can enable ultrafast energy storage and release, but advances in energy density and efficiency need to be made. Here, by doping equimolar Zr, Hf ...

The energy storage density of ferroelectric thin film capacitors is mainly limited by the breakdown strength. Here we demonstrate that the high breakdown strength and high ...

Amorphous films have excellent breakdown strength and energy storage efficiency, and have broad application prospects in dielectric film capacitors. However, its low polarization greatly ...

Among these studies, nano-scale BaTiO 3 (BT) based dielectric thin films have received widespread attention, but due to the low dielectric breakdown strength, the energy ...

The introduction of excess Mg can obviously increase the dielectric breakdown strength of thin films due to the appearance of an amorphous phase. The maximum ...

Low-temperature amorphous thin films with excellent energy storage properties play a crucial role in silicon-based microelectronic applications. The (1-x)S

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performance of BaTiO3-based amorphous thin films through the synergistic function of ...

Our study provides a new and widely applicable platform for designing high-performance dielectric energy storage with the strategy exploring the boundary among different ...

Herein, we introduce flexible amorphous thin-film energy harvesters based on perovskite CaCu3Ti4O12 (CCTO) thin films on a plastic substrate for highly competitive ...

Compared to traditional methods, this approach provides a more flexible and valid way to tune the energy storage performance of amorphous dielectric thin films. The high-entropy amorphous ...

Semantic Scholar extracted view of "Ultra-high energy storage density BaTiO3 amorphous thin film via multi-ion synergistic optimization" by Jian Zhang et al.

Compared with bulk capacitors, amorphous thin films have the advantages of small size, less defects and high breakdown strength (BDS), which makes amorphous thin ...

In addition, the obtained thin film shows excellent energy storage properties in a wide frequency range, fatigue durability and good thermal stability. These results indicated that ...

In this study, we have investigated the impact of co-doping at the A-site (La) and B-site (Mn) on the energy storage properties of the STO films. BDS of the co-doped thin films ...

Herein, a reasonable amorphous structure is applied to the preparation of dielectric film capacitors to improve the dielectric and energy storage properties. The high breakdown strength and ...