Energy storage density of glass-ceramics

Tremendous efforts have been made for further improvement of the energy storage density of BTO ceramic. The nature of strongly intercoupled macrodomains in the FE state can be modified to nanodomains as a characteristic of the relaxor-ferroelectric (RFE) state that lowers the energy barriers for polarization switching, and gives rise to a slimmer ...

The discharge storage energy density (W dis) is obtained using the following equation [6]: ... Structure, dielectric properties of low-temperature-sintering BaTiO 3-based glass-ceramics for energy storage. Journal of Advanced Dielectrics, 8 (2019) Google Scholar [27] G.-h. Chen, B. Qi.

DOI: 10.1016/J.JALLCOM.2016.06.024 Corpus ID: 138454093; Enhanced energy storage density and discharge efficiency in the strontium sodium niobate-based glass-ceramics @article{Wang2016EnhancedES, title={Enhanced energy storage density and discharge efficiency in the strontium sodium niobate-based glass-ceramics}, author={Haitao ...

Specifically, a high recoverable energy storage density (W rec) of 2.06 J/cm 3 can be achieved, alongside an ultrahigh efficiency (i) of 92.3 % under an electric field of 630 kV/cm. Additionally, this glass-ceramics also exhibit a high discharge energy density (W d) of 0.97 J/cm 3, an ultrafast discharge rate of 7 ns, and an exceptionally high ...

The energy storage densities of the glass-ceramic composites G0, G1, G2, G3, and G4 are 3.09, 8.15, 6.77, 4.58, and 3.99 J/cm 3, respectively. It is obvious that both a high dielectric constant and high breakdown strength could result in a high energy storage density, which is important for applications of high energy storage density dielectrics.

The Sr0.5Ba0.5Nb2O6 (SBN) dielectric ceramics with different SrO-B2O3-SiO2 (SBS) glass content were prepared via solid state reaction method. The effect of glass content on their sintering temperature, density, microstructure, dielectric and energy storage properties was investigated. The addition of glass was confirmed to be effective in reducing sintering ...

Dielectric glass ceramics have received increasing attention due to their good application properties in pulsed power devices. The influence of Gd 2 O 3 addition on the energy storage performance of BaO-K 2 O-Nb 2 O 5-SiO 2 glass ceramics was explored. The microstructure and energy storage density were significantly improved by adding Gd 2 O ...

However, the energy storage density and energy storage efficiency of many ceramics are low and cannot meet the requirements of device miniaturization [4]. Moreover, many energy storage ceramics exhibit poor temperature stability which cannot be used in high-temperature environments, such as automotive inverters

(140-150 °C) and downhole gas ...

Niobate glass-ceramics with varying amounts of glass have been prepared through a melted-quenching-controlled crystallization method. The influence of glass/ceramic ratio on the dielectric properties, energy storage characteristics and charge-discharge behavior of the [(SrO, K2O)-Nb2O5]-[SiO2-Al2O3] (SKN-SA) glass-ceramics was investigated. The ...

The energy storage density of ceramic bulk materials is still limited (less than 10 J/cm3), but thin films show promising results (about 102 J/cm3). ... ceramics with B 2 O 3 -Al 2 O 3 -SiO 2 (BAS) glass-ceramics, and results showed that the BCZT and BAS glass-ceramics phases could coexist in the ceramics and significantly improve the ...

Next-generation advanced high/pulsed power capacitors rely heavily on dielectric ceramics with high energy storage performance. However, thus far, the huge challenge of realizing ultrahigh ...

Hao et al. reported that PLZT ceramics with 1 µm thickness fabricated by a sol-gel method could yield a discharged energy density of 28.7 J cm -3 and an energy efficiency of 60% when the La/Zr/Ti ratio was 9:65:35, [42] Further, a remarkably improved energy storage density of 30.8 J cm -3 accompanied by a high energy efficiency of 68.4% ...

Although many efforts have been put in exploring the methods for enhancing the energy storage density in glass ceramics, such as by introducing nucleating agents like ZrO 2 or TiO 2, [9, 10] glass network modifiers like Na 2 O and K 2 O, [11, 12] and rare-earth/transition metal oxide additives like CeO 2, Sc 2 O 3, Gd 2 O 3, La 2 O 3, Sm 2 O 3 ...

For example, Wang et al. have reported a high energy storage density of 14.58 ± 1.14 J/cm 3 with a high BDS of 2382 ± 92 kV/cm in barium potassium niobate-based glass-ceramics [10]. In addition, the improved BDS and energy storage behaviors were achieved in Sm 2 O 3 -modified SrO-BaO-Nb 2 O 5 -SiO 2 glass ceramics [11] .

The energy-storage performance of a capacitor is determined by its polarization-electric field (P-E) loop; the recoverable energy density U e and efficiency i can be calculated as follows: U e = ? P r P m E d P, i = U e / U e + U loss, where P m, P r, and U loss are maximum polarization, remnant polarization, and energy loss, respectively ...

2 ???· Enhanced energy storage performance with excellent thermal stability of BNT-based ceramics via the multiphase engineering strategy for pulsed power capacitor ... exhibiting an ...

Web: https://www.arcingenieroslaspalmas.es