

Can diamond films be used as piezoelectric layers?

Since the mid-1990s, a range of practical SAW devices have been successfully fabricated using diamond films grown either on Si substrates or directly on SCD substrates, combined with ZnO, AlN, or AlScN as piezoelectric layers [Citation 136-138]).

Are diamond thin-films an alternative electrode material for dye sensitized solar cells?

Vispute RD, Vats A, Venkatesan V, et al. Electrical conducting diamond thin-films: an alternative counter electrode material for dye sensitized solar cells. MRS Proc. 2011;1282:1404.

Is diamond a heat spreader for GaN-based electronic devices?

Sang L. Diamond as the heat spreader for the thermal dissipation of GaN-based electronic devices. Funct Diam. 2021;1 (1):174-188. Geis MW, Fedynyshyn TH, Plaut ME, et al. Chemical and semiconducting properties of NO₂-activated H-terminated diamond. Diam Relat Mater. 2018;84:86-94. James MC.

Diamond possesses extraordinary properties, including extreme hardness, thermal conductivity, and mechanical strength. Global industrial diamond production is dominated by synthetic diamond, with important commercial applications in hard coatings and semiconductors. However, the life cycle impacts of synthetic diamond materials are largely unknown. The main aim of this ...

For thermal energy storage applications using phase change materials (PCMs), the power capacity is often limited by the low thermal conductivity (l PCM). Here, a three-dimensional (3D) diamond foam (DF) is proposed by template-directed chemical vapor deposition (CVD) on Cr-modified Cu foam as highly conductive filler for paraffin-based PCM.

Bulk diamond possesses a high electron mobility ($4500 \text{ cm}^2 \text{ V}^{-1} \text{ s}^{-1}$) as well as hole mobility ($3800 \text{ cm}^2 \text{ V}^{-1} \text{ s}^{-1}$) has a low exciton binding energy due to its high relative permittivity of 5.7. However, the low intrinsic carrier concentration causes the resistivity of bulk diamond to be as high as $1 \times 10^{13} - 1 \times 10^{16} \text{ } \Omega \cdot \text{cm}$ []. ...

Binder-free nickel/boron-doped diamond film electrodes for hydrogen evolution reaction in alkaline medium: Effect of nickel catalyst nanostructure on electrochemical performance ... Carbon materials have marvelous ability in energy storage and microelectronics as a result of the high specific surface area and electrical conductivity. However ...

The high-concentration N doping of diamond film is still a challenge since nitrogen is limited during diamond growth. In this work, a novel method combined with the thermal decomposition of silicon nitride was proposed to form the activated N and Si components in the reactor gas that surrounded the substrate, with which the high-concentration N and Si doping ...

Thermal stress is a big problem for DLC and diamond films due to the small coefficient of thermal expansion of ... A. Diamond-like carbon for magnetic storage disks. Surf. Coat. Technol. 2004 ... Matuda, N.; Baba, S.; Kinbara, A. Internal stress, young's modulus and adhesion energy of carbon films on glass substrate. Thin Solid Films 1981, 8 ...

The C₂ and CH species in the plasma are accountable for the secondary diamond nucleation and form nano-sized diamond grains for N-BDD 550 °C and N-BDD 700 °C films (Fig. 7 b) (spectra II-III of Fig. 6) [54] It is reported that the CN species require high T_s (>700 °C) to attain high activation energy in the plasma [55, 56] Moreover, the ...

The diamond films grown at lower T_s = 400 °C consist of faceted grains, and the grain sizes shrink as T_s is ... The ever-increasing requirement for portable electronic devices emphasizes the necessity for compact high-performance energy storage equipment. Currently, batteries and supercapacitors stand out as the most economical, efficient ...

APEI and International FemtoScience (FemtoSci) are currently investigating the use of chemical vapor deposition (CVD) nanodiamond films for application in high temperature, high energy ...

Thermal conductivity enhancement of phase change materials with 3D porous diamond foam for thermal energy storage. Author links open overlay panel Long Zhang a 1, Kechao Zhou a 1, Quiping Wei a, Li Ma a, ... Since the DF struts in this work consist of diamond films and Cu struts, the ρ of DF/paraffin was calculated by 1.3 vol% diamond filler ...

Superior recoverable energy density (W_{rec}) and efficiency (η) are crucial parameters for capacitors used in pulse-power devices. Here, we achieved an ultrahigh W_{rec} and high η in (Pb_{0.95-x} Ba_{0.02} Sr_x La_{0.02})(Zr_{0.65} Sn_{0.35})O₃ (PBSLZS) antiferroelectric thick film ceramics. All ceramics exhibit an orthorhombic structure, and the forward switching field ...

For all the diamond films, a remarkable Raman peak was observed near the natural diamond Raman peak of 1332 cm⁻¹, which indicated that a diamond phase was generated on the Si₃N₄ substrate ...

Supercapacitors supply high power densities but suffer from low energy densities and small specific capacitances. The design and implementation of unique capacitor electrodes are expected to overcome these challenges. Herein, flexible diamond fibers (a fibrous core/shell structure of diamond/carbon fibers) are produced through overgrowing conductive carbon ...

Advanced chemical vapor deposition (CVD) nanodiamond films are being explored as a new dielectric for high voltage, high energy density capacitors, capable of operating at temperatures greater than 200 °C. CVD diamond is considered to be a superior dielectric material for advanced capacitor technology, based on its extraordinary electrical and mechanical characteristics. ...

Ingenious combination of electrode material and flexible substrate could satisfy both performances of energy storage and flexibility of the FSSCs [3]. ... It was obvious that both BDD films had strong diamond characteristic peaks at around 1334 cm⁻¹, indicating that the BDD films are dominated by the diamond phase.

Several catalysts supported materials for energy storage and conversion have been carried out in order to improve of kinetic of the anode and cathode reactions, enhancing the ... Nanoporous honeycomb diamond films were fabricated from microwave plasma chemical vapor deposited diamond films by oxygen plasma etching through an alumina mask. These ...

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