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CVD DIAMOND FOR IONIZING RADIATION DETECTORS

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The advantages of diamond as a material for ionizing radiation detectors are its high radiation resistance, good tissue equivalence and ability to work at room and higher temperatures. Diamond detectors are indispensable for operation in the intense radiation fields (reactor core, radioactive waste storages, etc.).

In recent years work on synthesis of diamond using CVD technique is carried out in NSC KIPT. With increasing of the quality of CVD diamond, it's become perspective to produce new type of radiation detectors. Nowadays CVD diamond films with thickness up to 500 μm are produced.

Preliminary estimation of quality of CVD diamond films was carried out by means of optical microscopy and infrared spectrometry. For studying the electro-physical characteristics of CVD diamond, metallic contacts (Al, Ti) with different geometry were applied onto surface by the use of plasmachemical method and photolithography. Electrophysical properties of CVD diamond films were investigated by measuring current-voltage characteristics and induced charge distribution spectroscopy using 239Pu alpha particle source in air environment.

These investigations proved that detectors from CVD diamond, produced in NSC KIPT, may find application in dosimetry of high X-ray radiation flux. The possibility of CVD diamond usage as thermal neutrons detector (with (n, alpha) converter) is shown.

THE EFFECT OF THERMAL TREATMENT ON ENERGY CHARACTERISTICS OF LITHIUM POWER SOURCES ON NANOPOROUS CARBON BASE

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Among the wide class of promising electrode materials, special attention is paid at this time to nanometric scale powder materials, including nanoporous carbon which, due to its characteristics (highly developed specific surface of 1000-2000 m2/g and good electrical conductivity), are used in primary and secondary power sources [1-4]. One of the main factors, which determine the value of discharge characteristics of the power sources, is the size and surface morphology of the active

electrode material. In turn, the latter depend on the treatment regimes (thermal and/or chemical) of raw materials.

The research objects were nanoporous carbon materials obtained from apricot pits through their high-temperature carbonization (t = 600 ÷ 1100°C) in an autoclave at high pressure (~ 10 atm) of water steam atmosphere.

Electrochemical insertion of lithium ions into carbon materials was carried out in two-electrode cells. Metal lithium was as anode. 1M solution of lithium tetrafluorineborate (LiBF4) salt in γ-butirolactone was as an electrolyte.

As follows from the got results, the values of specific capacity and specific energy of nanoporous carbon depend non-monotonic on the conditions of high temperature treatment. It is set, that the maximal values of 1270 mA•h/g and 990 W•h/kg are observed at t = 700°C. The main factor that determines the behaviour of electrochemical systems, is the value of specific surface of carbon material, maximum of which of which (~ 24 m2/h) corresponds to the material received at temperature t = 700°C.

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2D MACROPOROUS SILICON STRUCTURES WITH SURFACE NANOCRYSTALS: ELECTRO-OPTICAL PROPERTIES

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One of the perspective materials for the development of 2D photonic structures is macroporous silicon that can be obtained by the method of photoanodic etching. In view of the potential barrier on a macropore surface or heterojunction on «macropore-nanocoating» boundary, one should take into account processes on the local surface centres at energies below that of the indirect interband transition.