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## **PROBLEMS OF INFORMATION IN THE FIELD OF NANOTECHNOLOGIES AND NANOMATERIALS. PLACE OF RUSSIA IN THE WORLD NANOCOMMUNITY**

***Andriyevsky R.A., Klyucharyova S.V***

The journals in the nanotechnology and nanomaterial field are analyzed. The significant increase of specialized journals and papers in classic natural scientific journals is marked. The attention is taken to decrease of the Russian publication activity in last years.

## **ON SOME MODERN TENDENCIES OF STUDYING PROPERTIES OF NANOMATERIALS (OVERVIEW OF FOREIGN LITERATURE)**

***Moskvitin G.V., Birger E.M., Polyakov A.N.***

The article provides an overview of the various experimental and analytical research methods of nanomaterials. The work reflects World tendencies in this direction.

Are some of the leading firms engaged in research and application of nanomaterials. Shows some of the equipment that is used to study the properties of nanomaterials.

**Keywords:** nanotechnology, nanomaterial, nanoparticle, nanouroven', nanoindentor, nanocarapanie, nanosklerometr, the test technique.

## **CARBOXILIZED CARBON NANOTUBES USED AS ACTIVE COMPONENTS OF SENSOR DEVICES**

***Zaporotskova I.V., Polikarpova N.P., Vilkeyeva D.E., Zaporotskov P.A.***

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Results of research of the mechanism of accession of carboxyl group to open border of a semi-infinite single-walled carbon nanotube «zig-zag» for formation of chemically active sensor are presented. Interaction of the sensor with some alkaline metals is studied. Process of scanning of any surface containing metal atoms or ions was modeled, and activity of functional group –COOH to the chosen element was defined. Calculations were performed using the semi-empirical scheme MNDO within the framework of the molecular cluster model and DFT method. The executed theoretical researches proved possibility of creation of a highly sensitive sensor on the basis of the carboxylated carbon nanotubes.

**Keywords:** carboxylated carbon nanotube, sensory activity, functional carboxyl group, alkali metals, chemical active probe, semi-empirical scheme MNDO.

## **STUDYING PHOTO-, AUTOELECTRONIC EMISSION IN NANOGRAINS OF INDIUM ANTIMONIDE AND ARSENIDE**

***Zhukov N.D.<sup>1</sup>, Glukhovskoy Ye.G.<sup>2</sup>, Bratashov D.N.<sup>2</sup>***

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Characteristics of field (autoelectronic) emission from nanograins of indium antimonide and arsenide narrow gap semiconductors have been studied by tunneling microscopy method. Coulomb blockade and low field emission phenomena have been detected and explained. Increased photo sensitivity has been noticed for own conductivity semiconductors. It makes them prospective as regards using them as IR photo autocathodes.

## TEMPERATURE DEPENDENCE OF HEAT CAPACITY AND HEAT CONDUCTIVITY OF EPOXY MATERIALS MODIFIED WITH METAL/CARBON NANOSTRUCTURES

**Artanov A.M.<sup>1</sup>, Zagrebin L.D.<sup>1</sup>, Mukhametshina I.Yu.<sup>1</sup>, Kodolov V.I.<sup>1,2,3</sup>, Chashkin M.A.<sup>3</sup>**

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Using a dynamic,  $\lambda$ -calorimeter in the temperature range 298–373 K were measured and the results of changes in heat capacity and thermal conductivity of epoxy resins modified with copper / carbon nanostructures. Found a change in thermal and structural properties of modified copper/carbon nanocomposite epoxy polymers.

**Keywords:** epoxy resin, metal/carbon nanostructures, nanocomposite, specific heat, thermal conductivity.

## NANOMODIFIED GALVANIC COATINGS

**Dyakov I.A.**

*Tambov State Technical University, Tambov, Russia*

The changes in the properties of the plating deposited in electrolytes containing carbon nanotubes. It is shown that the use of carbon nanotubes CNM «TAUNIT» in electrochemical coatings alter morphology tribological properties and thermal properties of coatings. Varying concentrations of CNM can control the properties of coatings, improving their properties.

**Keywords:** Electroplating, plating, nanomaterials, carbon nanotubes.

## «SILVER NANOPARTICLES – POLYPROPYLENE FIBEROUS CARRIER» BACTERICIDAL SYSTEM: OBTAINING AND PROPERTIES

**Malinovskaya T.D., Lysak G.V., Lysak I.A.**

The use of polypropylene fibrous material as a carrier for the silver nanoparticles was substantiated. By using of spectroscopic methods the mechanisms of forming nanoparticles on the support surface in two-phasic activation by ultraviolet and microwave radiations were investigated. The process of producing the bactericidal system of «silver nanoparticles – polypropylene fibrous material» was developed. The created system demonstrates high bactericidal activity and could be used for water cleaning from microbiological contamination.

**Keywords:** silver nanoparticles, polypropylene fibrous material, microwave radiation, bactericidal system.

## INDUSTRIAL RARE EARTH LUMINOPHORES FOR EFFECTIVE ENLIGHTENMENT LEDS

**Soshchin N.P., Lichmanova V.N., Bolshukhin V.A.**

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The microcrystalline powders of photoluminophores for LED on the basis of aluminium garnets structure and silicates with structure bredigite were prepared by use of the solid-state technology. For the synthesis were used nanodimension oxides:  $Y_2O_3$ ,  $Al_2O_3$  and fluoride salts.

It was shown that the photoluminophores exhibit high quantum output to 96% and ensure the emission in LED in the white spectral region up to 145 lm/W.

**Keywords:** nanotechnologies, multiligand phosphors, structure garnet, LED, efficiency.

## STUDYING POROUS STRUCTURE OF MINERAL-CARBON SORBENTS FOR CHROMATOGRAPHIC SEPARATION OF FULLERENES

**Postnov V.N., Krokhina O.A.**

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The parameters of the porous structure of the mineral-carbon sorbents (intended for the chromatographic separation of the  $C_{60}$ ,  $C_{70}$  fullerenes) obtained by chemical vapour deposition and cyclic deposition of carbon, by means of the methods of mercury porometry, low-temperature nitrogen adsorption, adsorption of benzene vapour were defined.

It was found that the sorbents have complex porous structure and contain macropores, mesopores (3–6 nm), as well as micropores.

It was shown that increasing the carbon content of mineral-carbon sorbents affects the pore size distribution.

A correlation between the volume of mesopores and  $C_{70}$  fullerene output in the process of chromatographic separation of fullerenes in toluene in the gravity mode was determined.

## STUDYING MICROSTRUCTURES OF NANOSIZED SALTS OF NYTRATES SUBJECTED TO EXTERNAL PRESSURE

**Kuznetsova I.A.**

*Moscow State University of Environmental Engineering, Russia*

The paper presents the results of the research of microstructures of nanoscale salts nitrates, received in the result of seals in the mould. Shows a comparison of nanoscale granules and the initial powders. The analysis of sealing materials.

**Keywords:** microstructure of nanomaterials, seal, microscopy, defects.

## CAPTURING AND TRANSFER OF AIR PORTION BY STEERED FLOW OF NANODISPERSE MAGNETIC FLUID

**Bashtovoy V.G., Polunin V.M., Boyev M.L., Ryapolov P.A.**

The processes of formation and relocation of an air cavity by the managed flow of nanodispersed magnetic fluid at a various speed mode are discussed. In the approximation of «low-magnetic» environment by finding surfaces of a constant potential of magnetostatic force, the shape of the cavity surface confined by magnetic levitation is studied. Experimental data on the stability of the cavity at a time and its steadiness in relation to pressure from the non-uniform magnetic field are presented. The results of evaluation of the size of bubbles detached from the cavity, received by two different methods, are in adequate agreement with each other.

**Key words:** a magnetic fluid, a magnetic levitation, a magnetic field, an air cavity, a column of MF, air bubbles, a shape of free surface.

## MULTICLUSTER NANOTECHNOLOGICAL SETUP FOR STUDYING AND MANUFACTURING NANOSCHEMES AND FUNCTIONAL NANOSYSTEMS FOR ENERGY SUPPLY SYSTEMS OF SPACESHIPS.

**Dubovoy A.N., Rodionov B.N., Yegorov S.D., Mazur S.N., Koroteyev A.V., Stepanov M.V., Khlyustov P.M.**

Multi Cluster Nano Technology Complex (MCNTC) with the open architecture is described. Are shown structure and opportunities of transport, technological, analytical modules MCNTC. In MCNTC group plasma technologies of clearing, sedimentation, etching (PC, PECVD, PE, RIE, DLC) and nanolocal zond technologies nanoetching and nanodeposition (NLZPE, NLZCVD) are realized. The modular open architecture, allows to provide flexible automatic control MCNTC and to increase its transport, technological, analytical opportunities. Solving component MCNTC is module «Supercomputer». It allows to organize closed a nanotechnology line – design-center + nanofabric. Module «Supercomputer» will allow to model and project microstructures, nanoelements, nanocircuits, functional nanosystems, MEMS, NEMS which can be made on MCNTC.

## ELECTRORHEOLOGICAL EFFECT IN POLYDIMETHYLOXANE SUSPENSION OF TITANIUM DIOXIDE-POLYPROPYLENGLYCOL NANOSIZED HYBRID MATERIAL

**Agafonov A.V., Krayev A.S., Davydova O.I., Zakahrov A.G.**

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Electrorheological effect in suspensions with nano-sized powders of inorganic-organic hybrid material titanium dioxide-poly(propylene) glycol as filler was studied in polydimethylsiloxane. The content of the dispersed phase was 15 and 30 percent per volume. Description of apparatus for the measurement of electrorheological effect by the tensile stress-compression electrorheological fluid in electric fields up to 5 kV/mm was given. 30 vol % suspension hybrid material titanium dioxide-poly(propylene)glycol in the polydimethylsiloxane has a yield stress of 60 kPa in the electric field 4 kV/mm.

**Keywords:** electrorheological effect, electrorheological fluid, hybrid inorganic-organic nanomaterials, electric field influence.