

РЕЗЮМЕТА НА НАУЧНИТЕ ТРУДОВЕ

на

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B4.1

Dimitar Teodosiev, **Anna Bouzekova-Penkova**, Boyko Tsyntsarski, Jordan Georgiev, Denitsa Borisova, Valentina Hristova (2023), Spherical sensors with glassy carbon coatings for measurement of electric fields in near-earth plasma on board satellites, Ninth International Conference on Remote Sensing and Geoinformation of the Environment (RSCy2023), 12786, 1278620:1-8, ISSN 0277786X, ISBN 978-151066822-5, doi: 10.1117/12.2680612, SJR:0.166

Индексирана в: Scopus - SJR

Spherical sensors with glassy carbon coatings for measurement of electric fields in near-earth plasma on board satellites

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ABSTRACT

The development of satellite research to study the processes in the near-Earth plasma requires improvement of the scientific equipment, measurement methods and increasing the accuracy of the obtained data. There are actual and relevant issues which worth investigation: detailed study of the energy, momentum and mass transfer processes in the critical areas of the solar wind - magnetosphere system; explore the effects of the processes taking place in the earth's crust, which cause earthquakes; the effects of magnetospheric-ionospheric plasma related to climate changes, etc. The investigation of the processes taking place in the magnetospheric-ionospheric plasma requires simultaneous multicomponent measurements of the main parameters of the space plasma, including also the electric fields, at different points of the Earth orbit, on the board of satellites. For the measurement of direct (DC) and alternating (AC) electric fields in the magnetospheric-ionospheric plasma, various methods and technologies for sensor preparation are developed and applied successfully. A method of the double probe by using an original Bulgarian technology for sealing and covering with glassy carbon of the surface of the sensitive parts of the probes, which ensures maximal accuracy of measurements of constant and alternating electric fields when working in open space, is considered. The experiments from eight satellites and one technological experiment on board the International Space Station (ISS), where these measurements were carried out, are presented. Possibilities for the application of the obtained results in the analysis of energy transfer processes in the Earth plasma and their impact on the environment are demonstrated. This work is financially supported by the Bulgarian National Science Fund under Project KP-06-N27/2 (KPI-06-H27/2), 08.12.2018.

Keywords: spherical sensors, satellite experiments, glassy carbon coatings, constant and alternating electric fields

B4.2

Boyko Tsyntsarski, **Anna Bouzekova-Penkova**, Urszula Szeluga, Georgi Georgiev, Peter Tzvetkov, Dimitar Teodosiev (2023) SEM and EDX study of glassy carbon coatings after an extended stay on the international space station (ISS), Aerospace Research in Bulgaria, 35, 165-173, ISSN 1313-0927, SJR-0.08, <https://doi.org/10.3897/arb.v35.e16>

Индексирана в: Web of Science - Q4

Bulgarian Academy of Sciences. Space Research and Technology Institute.
Aerospace Research in Bulgaria. 35, 2023, Sofia

SEM AND EDX STUDY OF GLASSY CARBON COATINGS AFTER AN EXTENDED STAY ON THE INTERNATIONAL SPACE STATION (ISS)

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Keywords: Glassy carbon, Cosmic ray and Gamma radiation, Scanning electron microscopy (SEM), X-ray spectroscopy (EDX)

Abstract

Graphite samples covered with glassy-carbon layers, have stayed for 2 years and 4 months under different conditions - terrestrial conditions and on the International Space Station. The influence of outer space on glassy carbon coatings was studied by scanning electron microscopy (SEM), energy dispersive X-ray spectroscopy (EDX), Raman and infrared spectroscopy. The results show presence of some defects and heteroatoms (traces of O, F, Na, Cl) after staying in space, probably due to radiation and other effects. SEM data provide valuable information about the existence of undamaged glassy carbon layer with thickness of 20 μm . There are no structural changes in the layers of glassy carbon after stay in space. Data show that these materials can be successfully applied for electrical field measurements in ionosphere.

B4.3

Dimitar Teodosiev, **Anna Bouzekova-Penkova**, Silviya Simeonova, Nikolay Grozev (2023) Contact angle and AFM analysis of glassy carbon coatings after an extended stay on the international space station (ISS), Comptes rendus de l'Académie bulgare des Sciences, 76(2), 256-263, ISSN 13101331, SJR-0.182, DOI: <https://doi.org/10.7546/CRABS.2023.02.10>

Индексирана в: Scopus - Q3

**CONTACT ANGLE AND AFM ANALYSIS OF GLASSY
CARBON COATINGS AFTER AN EXTENDED STAY
ON THE INTERNATIONAL SPACE STATION (ISS)**

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Silviya Simeonova*, Nikolay Grozev***

Received on November 3, 2022

Presented by P. Atanasov, Member of BAS, on January 31, 2023

Abstract

The proposed work presents the results for contact angle and atomic force microscopy (AFM), which are applied to characterize the surface of two types of samples, “reference” sample and “space” sample, both made of the same material – graphite covered with glassy carbon coating, but stored for 28 months in different environments (conditions). One “space” sample was mounted outside the International Space Station, and the other “reference” sample was stored on Earth.

The technique applied to measure the contact angle of wetting of the surface of the samples (hydrophilicity-hydrophobicity) is using water droplets. Values of the energy surface area of the sample surfaces were determined by measuring the contact angle with the substances formamide and diiodomethane. Atomic force microscopy (AFM) was applied to characterize the glass surface morphology of carbon coatings.

B4.4

Dimitar Teodosiev, **Anna Bouzekova-Penkova**, Rositsa Koleva, Dimitar Tonev, Elena Geleva, Boyko Tsyntarski, Peter Tzvetkov, Nikolay Goutev, Anguel Demerdjiev, Bozhidar Slavchev (2023) Investigation of the influence of ionization radiation on glassy carbon coatings, after long stay in the outer space on the International Space Station (ISS), Comptes rendus de l'Académie bulgare des Sciences, 76(10), 1495-1504, ISSN 13101331, SJR-0.182, DOI: <https://doi.org/10.7546/CRABS.2023.10.03>

Индексирана в: Scopus – Q3

INVESTIGATION OF THE INFLUENCE OF IONIZATION
RADIATION ON GLASSY CARBON COATINGS,
AFTER LONG STAY IN THE OUTER SPACE
ON THE INTERNATIONAL SPACE STATION (ISS)

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Presented by P. Atanasov, Member of BAS, on July 31, 2023

Abstract

In this study two types of samples of spectrally pure graphite, compacted and coated with glassy carbon, were analyzed with liquid scintillation spectrometry, scanning electron microscopy (SEM) and X-ray diffractometry (XRD). “Space” sample has been sent in outer space on the surface of ISS for 28 months. “Space” sample is compared with “reference” sample, made of the same material, but stored on Earth for the same period.

Radiation environment data were collected using R3DR2-Lyulin instrument, located in the outer space very close to the samples, in the same module of ISS. The effect of cosmic radiation leads to slight increase of ^{14}C content, detected by liquid scintillation spectrometry.

SEM and thermal test using XRD did not show any noticeable changes in terms of structure and phase composition. This confirms the high degree of reliability of this material under significantly milder operating conditions in Earth orbit.

Key words: glassy carbon, graphitizing carbon, cosmic ray and gamma radiation, ISS

B4.5

Anna Bouzekova-Penkova, Silviya Simeonova, Dimitar Teodosiev (2024) AFM analysis of glassy carbon coatings after an extended stay on the international space station (ISS), Aerospace Research in Bulgaria, 36, 169-176, ISSN 1313-0927, DOI: <https://doi.org/10.3897/arb.v36.e15>

Индексирана в: Web of Science – Q4

AFM ANALYSIS OF GLASSY CARBON COATINGS AFTER AN EXTENDED STAY ON THE INTERNATIONAL SPACE STATION (ISS)

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Keywords: Atomic Force Microscopy (AFM), Glassy carbon, Graphitizing carbon, Cosmic ray and gamma radiation

Abstract

In this paper we present the results of atomic force microscopy (AFM), which is applied to characterize the surface morphology of graphite samples with glassy carbon coatings is developed, stored for 28 months under different conditions. One sample was stored on Earth at room temperature and second one was mounted on the outer side of the International Space Station.

B4.6

A. Tsanev, K. Grigorov, H. Koley, **A. Bouzekova – Penkova**, B. Tsyntsarski, P. Tsvetkov, D. Teodosiev (2024) XPS investigation of the work function of glass carbon coatings after extended stay on the international space station (ISS), Aerospace Research in Bulgaria, 36, 177-188, ISSN 1313-0927, DOI: <https://doi.org/10.3897/arb.v36.e16>

Индексирана в: Web of Science – Q4

XPS INVESTIGATION OF THE WORK FUNCTION OF GLASSY CARBON COATINGS AFTER EXTENDED STAY ON THE INTERNATIONAL SPACE STATION (ISS)

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Keywords: *X-ray photoelectron microscopy (XPS), Glassy carbon, Cosmic ray and gamma
radiation.*

Abstract

Using XPS, the electron work function values on the surface of glassy carbon coatings of graphite samples, after an extended stay on a board of the ISS in open space conditions, were investigated. The results were compared with the characteristics of glassy carbon coatings of samples left on the ground for the same period. It was found that the electron work function does not change significantly, and this proves the possibilities for the successful application of these coatings, obtained by original Bulgarian technology, for space experiments on the board of satellites for measuring electric fields in the ionospheric-magnetospheric plasma. The minimal observed variations in the values of the electron work function are explained by small differences in the content of traces of different chemical elements on the surface of the coatings. It has been established that glassy carbon coatings have stable characteristics after a long stay in space, despite the small fluctuations in the values of the electron work function. The results show that glassy carbon coatings are chemically and mechanically stable. The results from this original technological experiment are unique for the development of sensitive elements, such as sensors for measuring weak electric fields in cosmic plasma.

B4.7

Peter Getsov, **Anna Bouzekova-Penkova**, Nikolay Zagorski, Garo Mardirossian, Dimo Zafirov (2024) Impact of spacecraft and ISS engines on experimental samples of various materials mounted on the outer surface of the “ZVEZDA” module, Aerospace Research in Bulgaria, 36, 189-200, ISSN 1313-0927, DOI: <https://doi.org/10.3897/arb.v36.e17>

Индексирана в: Web of Science – Q4

IMPACT OF SPACECRAFT AND ISS ENGINES ON EXPERIMENTAL SAMPLES OF VARIOUS MATERIALS MOUNTED ON THE OUTER SURFACE OF THE “ZVEZDA” MODULE

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Keywords: *Spaceships, Engines, Gas jet, Experimental samples*

Abstract

The work presents a study of the influence of the spacecraft and ISS engines during the correction of the station's orbit. The zones of action of the gas jets and their impact on the environment and the surfaces of the experimental samples of various materials mounted outside the “Zvezda” module were determined.

B4.8

Dimiter Teodosiev, **Anna Bouzekova-Penkova**, Boyko Tsyntsarski, Peter Tzvetkov, Urszula Szeluga (2025) Assessment of some structural properties of novel glassy carbon coatings, Aerospace Research in Bulgaria, 37, 192-199, ISSN 1313-0927, DOI: <https://doi.org/10.3897/arb.v37.e19>

Индексирана в: Web of Science – Q4

ASSESSMENT OF SOME STRUCTURAL PROPERTIES OF NOVEL GLASSY CARBON COATINGS

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Keywords: *Glassy carbon, Glassy carbon coatings, X-ray diffraction, Scanning electron microscopy (SEM), Raman spectroscopy*

Abstract

The main aim of this work is to investigate the stability at high temperatures, graphitization properties, and possible application of graphite samples coated with a glassy-carbon layer. Two types of samples were stored in two different environments for a period of 2 years and 4 months – one in terrestrial conditions and the other in open space, mounted on the Star module of the International Space Station. The effect of space on the glassy carbon coatings was investigated by Scanning electron microscopy, powder X-ray diffractogram, Raman spectroscopy, and BET experiments.

B4.9

Anna D. Bouzekova-Penkova, Dimitar K. Teodosiev, Temenuzhka G. Spasova (2025), Assessment of electromagnetic radiation in the urban environment, Eleventh International Conference on Remote Sensing and Geoinformation of Environment (RSCy2025), 13816, 138161C:1-10, <https://doi.org/10.1117/12.3069141>

Индексирана в: Scopus - SJR

Assessment of electromagnetic radiation in the urban environment

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ABSTRACT

With the development and improvement of mobile communications, a very topical issue in urban areas is electromagnetic pollution (EMP) from telecommunication technologies. These are the so-called artificial sources of electromagnetic fields that affect the environment and living organisms. The paper presents an analysis and evaluation of results from measurements of electromagnetic radiation from base stations of mobile operators in a sparsely urbanized environment. The presented results were obtained using mobile measurement equipment Narda AMB-8057-03 in the frequency range 100 kHz to 7 GHz. This frequency range covers the frequencies of all mobile operators operating on the territory of Bulgaria and allows tracking the dynamics of electromagnetic emissions from the antennas, on weekdays and weekends. The observed dynamic changes were analyzed as a function of local time, distance from base stations, data traffic load, and the characteristics of the surrounding environment. The data obtained prove that the measured levels of electromagnetic fields are safe, according to current national legislation and European standards. The development of mobile communications requires continuous monitoring and control of electromagnetic pollution, through the construction of systems for monitoring electromagnetic emission.

B4.10

Anna Bouzekova-Penkova, Vanya Dyakova, Yoanna Kostova, Hristina Spasova, Adelina Miteva (2026) Investigation of the corrosion behavior of B95 (AA7075) aluminum alloy reinforced with nanodiamond and tungsten after exposure to outer space, Aerospace Research in Bulgaria, ISSN 1313-0927

Индексирана в: Web of Science - Q4

INVESTIGATION OF THE CORROSION BEHAVIOR OF B95 (AA7075) ALUMINUM ALLOY REINFORCED WITH NANODIAMOND AND TUNGSTEN AFTER EXPOSURE TO OUTER SPACE

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Keywords: aluminium alloy 7075, corrosion resistance alloy, corrosion behavior alloy

Abstract

This study investigates the corrosion behavior of aluminum alloy AA7075 (B95), reinforced with 0.1 wt.% nanodiamond powder and tungsten. Two sets of alloy samples were stored for 28 months under different conditions: "reference" – under natural terrestrial conditions, and "space" – in outer space, mounted on the International Space Station (ISS). The corrosion resistance of both sample types was evaluated using gravimetric and electrochemical methods in a 3.5% NaCl solution. Despite similar average corrosion rates (~0.06 mm/year), significant differences in the surface corrosion morphology were observed. The „space“ samples exhibited deeper pitting and localized corrosion along specific microstructural phases, whereas the „reference“ samples demonstrated more uniform surface degradation. Electrochemical tests confirmed enhanced corrosion resistance of the „space“ alloy, showing a threefold reduction in corrosion current density and a more positive corrosion potential compared to the "reference" samples. This behavior is attributed to microstructural changes induced by prolonged exposure to outer space, including the formation of a denser protective Al₂O₃ layer and the migration of alloying elements (Zn, Cu).

Г7.1

Adelina Miteva, Anna Bouzekova-Penkova (2025) Advancements in aerospace alloys: navigating the future of aviation and space exploration, Aerospace Research in Bulgaria, 37, 223-238, ISSN1313-0927, DOI: 10.3897/arb.v37.e23

Индексирана в: Web of Science - Q4

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DOI: <https://doi.org/10.3897/arb.v37.e23>

ADVANCEMENTS IN AEROSPACE ALLOYS: NAVIGATING THE FUTURE OF AVIATION AND SPACE EXPLORATION

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Keywords: Aerospace alloys, Material innovation, Aviation materials, Space exploration materials, Alloy development, Aerospace applications

Abstract

In the dynamic world of aerospace engineering, the search for innovative materials has always been at the forefront. The aerospace industry relies heavily on alloys that can withstand extreme conditions, maximize performance, and minimize weight and cost. As we move into the future, several alloys have emerged as the most promising candidates for aerospace applications. Here are a few of the most promising alloys for aerospace applications: composites, nickel-based superalloys, titanium aluminides, high entropy alloys, shape memory alloys, etc. This article provides a brief overview of some of these extraordinary materials that outline a brighter future for the aerospace industry. The article offers a dialogue and cites particular innovations originating from Bulgaria. Future directions for research in this field are explored.

Г7.2

Anna Bouzekova-Penkova (2026) Influence of Outer Space on the Structural and Mechanical Properties of Strengthened Aluminum Alloy AA7075 with nanodiamond and Tungsten, Aerospace Research in Bulgaria, 38

Индексирана в: Web of Science - Q4

Bulgarian Academy of Sciences. Space Research and Technology Institute.
Aerospace Research in Bulgaria. 38, 2026, Sofia

INFLUENCE OF OUTER SPACE ON THE STRUCTURAL AND MECHANICAL PROPERTIES OF STRENGTHENED ALUMINUM ALLOY AA7075 WITH NANODIAMOND AND TUNGSTEN

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Keywords: *aluminum alloys, aluminum alloy AA7075, aerospace, space, electromagnetic radiation, radiation*

Abstract

Space represents the most demanding environment for materials that make up space missions. They are exposed to intense electromagnetic radiation generated by various objects and phenomena, including solar radiation, cosmic rays and other forms of ionizing radiation. This work analyzes the influence of the components of the space environment, especially cosmic radiation and extreme temperature fluctuations, and the effects they have on a new composite material based on aluminum alloy AA7075 (B95) with a quantitative addition of ultradisperse diamond powder /UDDP/ and tungsten /W/. In order to clarify the specific mechanisms of influence on the physicochemical and, in particular, mechanical properties of the composite alloy after prolonged exposure of the material in outer space (28 months), the material was compared with a reference samples, stored for the same period in terrestrial conditions.

Г7.3

Anna D. Bouzekova-Penkova, Dimitar K. Teodosiev, Temenuzhka G. Spasova (2025) Electromagnetic radiation in urban environments, heat islands in the center of Sofia, Eleventh International Conference on Remote Sensing and Geoinformation of Environment (RSCy2025), 138161, 38161Z: 1-7, <https://doi.org/10.1117/12.3071084>

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Electromagnetic radiation in urban environments, heat islands in the center of Sofia

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ABSTRACT

The problem of electromagnetic fields of artificial origin in populated areas, characterized by a high concentration of various terrestrial sources (television, radio transmitters, mobile operator base stations, etc.), is becoming increasingly relevant. The level of electromagnetic fields of artificial origin in a number of cases significantly exceeds the level of electromagnetic fields from natural sources. Therefore, it is necessary to monitor and assess the parameters of electromagnetic fields in urban environments, as these territories also fall into the so-called "urban heat islands". The work presents results of measurements of electromagnetic radiation from base stations of mobile operators, at a site in a highly urbanized environment, the center of Sofia, Bulgaria. An analysis and evaluation of the results obtained was carried out and it was established that the reported values of radiated electromagnetic energy in the range 100 kHz - 7 GHz are below the permissible levels, according to current national legislation and European standards.

Г7.4

Anna D. Bouzekova-Penkova, Dimitar K. Teodosiev, Temenuzhka G. Spasova, Adlin R. Danchev (2025) Monitoring of electromagnetic radiation in a highly urbanized environment, Conference on Remote Sensing Technologies and Applications in Urban Environments X, 15-18.09.2025, Madrid, Spain

Индексирана в: Scopus - SJR

Monitoring of electromagnetic radiation in a highly urbanized environment

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ABSTRACT

The work presents an analysis and evaluation of results from measurements of electromagnetic radiation from base stations of mobile operators, at a site in a highly urbanized environment, the city of Sofia, the capital of Bulgaria. Ten base stations are located on all sides of the object, due to the fact that the site is located near a large Business Park. The points from which the measurements were taken were selected to cover as much of the territory of the surveyed object as possible. The measurements were made with a Narda AMB-8057-03 mobile device in the frequency range 100 kHz to 7 GHz.

Initial measurements showed at one of the points, which is located at the level of the bases stations antennas, instantaneous maximum peak values exceeding 10 $\mu\text{W}/\text{cm}^2$ for the 1842 MHz frequency range. During a certain time interval, measurements were carried out at the same point, which again reported instantaneous maximum peak values exceeding 10 $\mu\text{W}/\text{cm}^2$ for the same frequency range, while the 24-hour average values remained within the legal limits. At the remaining points where measurements were taken, the obtained electric field intensity values for Peak and RMS for the three frequency ranges 942 MHz, 1842 MHz and 2140 MHz are within the limits imposed by ICNIRP and national legislation. The variability of measurements indicates that the characteristics of the electromagnetic environment must be assessed regularly to understand trends in electromagnetic radiation and to impose specific protective measures. The development of methods for assessing and optimizing electromagnetic radiation in urban environments is argued, through the construction of an EMF monitoring system in a highly urbanized environment - the city of Sofia.

Г7.5

Denitsa Borisova, Hristo Nikolov, Ventzeslav Dimitrov, **Anna Bouzekova-Penkova** (2023) Framework concept of the project “The ancient wheat - growth and physiological characteristics under unfavorable stress factors and possibilities to alleviate the negative effects”, Ninth International Conference on Remote Sensing and Geoinformation of the Environment (RSCy2023), 12786, 127860A: 1-7, ISSN 0277786X, SJR-0.166, doi: 10.1117/12.2681932

Индексирана в: Scopus – SJR

Framework concept of the project “The ancient wheat - growth and physiological characteristics under unfavorable stress factors and possibilities to alleviate the negative effects”

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ABSTRACT

The project “The ancient wheat - growth and physiological characteristics under unfavorable stress factors and possibilities to alleviate the negative effects” is in line with the scientific priorities of the Bulgarian National Research Strategy: Improvement of the quality of life – food, environment protection, with the EU FP „Horizon Europe”: Food, bioeconomy, agriculture & environment, and with launching an International Research Initiative for Wheat Improvement. This initiative is based on the urgent need for all countries to speed the progress in wheat in relation to its productivity, adaptivity, stress tolerance and efficient use of nutrients. In the same time the project match the objectives of the European Space Strategy and the European Space Policy - to support the appropriate research activities fostering the exploitation of the technical capabilities of the space community with the objective of seizing market opportunities and meeting the demands of the society. The project's goal is to use the technical capabilities for spectral measurements in remote sensing monitoring of wheat crops under unfavorable stress factors that is relevant to the European Policies in the domain of the most advances information technologies. Aiming optimal combination, integration and dissemination of data and services, the project will create further interdisciplinary perspectives. Spectral measurement data will enable the validation of information products with respect to the accuracy and reliability of the data. The planned spectral measurements and the acquired data closely correspond to the "Copernicus" program. The remotely sensing obtained data will be used for knowledge upgrading about relation between unfavorable stress factors and spectral data. This will contribute to the widespread dissemination of scientific results and will be used to link space remote monitoring and ground-truth data. This work is supported by the Bulgarian National Science Fund under Project KP-06-N56/15 (КП-06-H56/15).

Г7.6

Galina Cherneva, Valentina Hristova, Denitsa Borisova, **Anna Bouzekova-Penkova**, Daniela Avetisqn (2023) Compensation of linear distortions in case of transmitting measurement information, Earth Resources and Environmental Remote Sensing/GIS Applications XIV, part of SPIE Remote Sensing 2023, Amsterdam, Netherlands, vol. 12734, 127341G: 1–7, ISSN 0277786X, ISBN 978-151066697-9, SJR – 0.17, doi: 10.1117/12.2680510

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Compensation of linear distortions in case of transmitting measurement information

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ABSTRACT

A fundamental problem in the transmission of measurement information in contemporary information management systems is the distortion of the signals as an outcome of uneven frequency characteristics of the connection channels. The link channel, as the signal propagation medium, is part of the cascades, as at the transmitter as well at the receiver. The linear distortions of the signal consist in a change in its information parameters, and they can be related to its amplitude and phase spectrum. Compensation of signal distortions is an effective and operative method for increasing the speed of transmitted information and the quality of measurement systems.

To compensate for amplitude and phase distortions of the signals, correctors are gained, which are connected coherently to the link channel.

The properties of the correctors are identified by their transfer function, frequency response and attenuation. Depending on the assign of elements in the circuit of the corrector, different frequency characteristics and attenuation are derived. Of particular importance is the question of their sensitivity, both to a change in a certain parameter of the scheme, and to the frequency.

In the presented work, a fusion of a digital corrector is proponed for the compensation of linear distortions in the transmission of discrete signals. Its characteristics have been explored and analyzed, and conclusions have been drawn regarding its effectiveness and application.

Г7.7

Temenuzhka Spasova, Adlin Dancheva, Iva Ivanova, **Anna Bouzekova-Penkova** (2025)
Monitoring of renewable energy sources in the area of Ihtiman municipality, Bulgaria,
Conference on Remote Sensing Technologies and Applications in Urban Environments X, 15-
18.09.2025, Madrid, Spain

Индексирана в: Scopus – SJR

Monitoring of renewable energy sources in the area of Ihtiman municipality, Bulgaria

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ABSTRACT

The present study is a comparative analysis and application of a quasi-synchronous approach for Land Surface Temperature (LST) to two sites with areas occupied by Renewable Energy Sources (solar panels) based on satellite data and methods for monitoring heat pollution on the territory of the town of Ihtiman in Western Bulgaria. The study analyzed various spectral indices such as Tasseled cap transformation (TCT), Normalized Differential Greenness Index (NDGI), LST and other satellite-based data from Sentinel 2 Multi-Spectral Instrument (MSI), Sentinel 3 SLSTR Level-2 and Landsat 8,9 OLI/TIR to assess the condition and dynamics of the territories. The interest in the sites is due to the fact that a large part of the sites are located near the city of Sofia, where high electricity consumption, severe drought in the territories, a sharp change in forest resources, and high temperature amplitudes were also registered for the period of the last three years (2023-2025). The results showed high values of heat pollution and changes in moisture and vegetation around the sites, which requires urgent measures to effectively manage not only the town of Ihtiman, but also of other cities. The satellite data used for LST have a correlation above 0.96.

Г7.8

Adlin Dancheva, Temenuzhka Spasova, Iva Ivanova, **Anna Bouzekova-Penkova** (2025) Employing remote sensing data for detection of unregulated landfills around Stolipinovo district, Plovdiv province, Bulgaria, Conference on Remote Sensing Technologies and Applications in Urban Environments X, 15-18.09. 2025, Madrid, Spain

Индексирана в: Scopus – SJR

Employing remote sensing data for detection of unregulated landfills around Stolipinovo district, Plovdiv province, Bulgaria

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ABSTRACT

The present work investigates an unregulated landfill located in the immediate vicinity of the Stolipinovo district, Plovdiv. In June 2015, specialized teams began removing illegal landfills in the district. Despite clean-up efforts, the region continues to face challenges with waste accumulation, partly due to insufficient waste collection infrastructure. Monitoring landfills (regulated or unregulated), their thermal pollution and dynamics through remote sensing methods can and does have a number of advantages that make these methods extremely effective. This is because remote sensing contributes to greater safety and accessibility for researchers, the observation of multiple parameters, much more effective monitoring of landfills devoid of the subjective factor, easy detection of illegal landfills, effective assessment of natural disaster risk, control over recycling and waste tracking, reduction of financial costs for human monitoring and last but not least generation of a large database for climate analyses. This study presents various approaches to spatial data analysis that can be used to locate and map unregulated dumps located within the Stolipinovo district. Various methods for visualization and interpretation of satellite data have been used. Composite images from the multispectral instrument (MSI) of the Sentinel 2 platform of the Copernicus program of the European Space Agency were used. The land surface temperature of the landfill was calculated using the thermal bands from the Landsat as Landsat 8, Landsat 9 (OLI / TIRS) and Sentinel 3 SLSTR sensors. Data from different seasons and years were used in order to monitor the dynamics of thermal pollution in the study area. Assessment of the territory on which the unregulated dump located has been made.

Г8.9

Бузекова А. Д., С. Я. Ставрев; Ст. Д. Козаров; Г. Станев (2005) Предварителна подготовка на експеримент “Обстановка” – програма за наземна експериментална обработка; Scientific Conference “SPACE, ECOLOGY, SAFETY” with International Participation, 10–13.06.2005, Varna, Bulgaria, book II, 361-365, ISBN 954-438-485-5

S E S ‘ 2 0 0 5

Scientific Conference “SPACE, ECOLOGY, SAFETY” with International Participation
10–13 June 2005, Varna, Bulgaria

ПРЕДВАРИТЕЛНА ПОДГОТОВКА НА ЕКСПЕРИМЕНТ “ОБСТАНОВКА” – ПРОГРАМА ЗА НАЗЕМНА ЕКСПЕРИМЕНТАЛНА ОБРАБОТКА

А. Д. Бузекова; С. Я. Ставрев; Ст. Д. Козаров; Г. Станев

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Ключови думи: *алуминиеви сплави, ултрадисперсен диамантен прах*

Резюме: *Към съвременните алуминиеви сплави се предявяват редица изисквания: физико-механични показатели, възможност за работа в експериментални условия (високи и ниски температури, цикличност на натоварването, облъчване в широк диапазон с различни видове лъчения). Ето защо изследването на такъв вид материал е целесъобразно да се извърши в условията на открития космос. При подготовката на един такъв експеримент се налагат редица специфични изисквания: (ограничение по маса, възможност за боравене от оператор-космонавт и т.н.).*

На тези въпроси е даден отговор в дадения доклад по експеримент “ОБСТАНОВКА”.

Г8.10

Bouzekova-Penkova A. (2025) Effect of electromagnetic radiation in space on aluminum alloy AA7075, International journal for science, technics and innovations for the industry “Machines, Tehnologies, Materials”, 19(9), 353-355, p-ISSN 1313-0226, o-ISSN 1314-507X, <https://stumejournals.com/journals/mtm/2025/9/353>

INTERNATIONAL SCIENTIFIC JOURNAL "MACHINES. TECHNOLOGIES. MATERIALS"

WEB ISSN 1314-507X; PRINT ISSN 1313-0226

Effect of electromagnetic radiation in space on aluminum alloy AA7075

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Abstract: Electromagnetic radiation in space presents a significant challenge to the durability of aluminum alloys used in spacecraft construction. This study analyzes the effects of ionizing radiation (gamma rays, cosmic rays, solar particles), ultraviolet and solar radiation, electromagnetic pulses (EMP), and extreme temperature fluctuations on a novel composite material based on AA7075 (B95) aluminum alloy. The results demonstrate that prolonged exposure of the material in outer space (28 months) leads to structural changes and alterations in mechanical properties. To ensure the reliability of the results, the space-exposed samples were compared with reference samples stored under terrestrial conditions.

Г8.11

Bouzekova-Penkova A., Teodosiev D. (2025) Measurements of electromagnetic fields emitted in urban environments, International journal for science, technics and innovations for the industry “Machines, Tehnologies, Materials”, 19(9), 329-341, p-ISSN 1313-0226, o-ISSN 1314-507X, <https://stumejournals.com/journals/mtm/2025/9/329>

INTERNATIONAL SCIENTIFIC JOURNAL "MACHINES. TECHNOLOGIES. MATERIALS"

WEB ISSN 1314-507X; PRINT ISSN 1313-0226

Measurements of electromagnetic fields emitted in urban environments

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Abstract: The paper presents an analysis of the results of measurements of electromagnetic radiation from a base station installed on the roof of a site located in an area with a higher degree of urbanization, an extended center of the capital of Bulgaria, Sofia. Using mobile measuring equipment Narda AMB-8057-03, the dynamics of electromagnetic radiation in the frequency range from 100 kHz to 7 GHz was monitored over a period of eight days (weekdays and weekends). The obtained values for the levels of electromagnetic fields comply with the current national legislation and European standards. They are $\leq 10 \mu\text{W}/\text{cm}^2$. However, there remains a need for monitoring, tracking and control of the emitting EMF sources, because the susceptibility of an individual person is individual and the possible health effects are different, which in some cases manifests itself as “hypersensitivity” to electromagnetic radiation.

Г8.12

Anna Bouzekova-Penkova, Dimitar Teodosiev (2025) Rapid-decompression and Electromagnetic interference Testing of Tablets, сборник доклади от научна конференция “Знание, наука, иновации, технологии”, 1116-1125, p-ISSN 2815-3472, CD-ISSN 2815-3480, <https://www.cceol.com/search/journal-detail?id=2883>

Индексирана в: CEEOL

RAPID-DECOMPRESSION AND ELECTROMAGNETIC INTERFERENCE TESTING OF TABLETS

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Abstract: *For tablets to be used on an aircraft, there are strict requirements to ensure they do not interfere in any way with the aircraft's equipment and systems during critical flight phases. This article presents the results of functional tests conducted in a vacuum chamber on tablets under decompression and electromagnetic interference conditions. Following the tests, conducted in accordance with European standards, the devices were found to be fully operational and safe with respect to disrupting the aircraft's onboard systems.*

Г8.13

Anna Bouzekova-Penkova, Dimitar Teodosiev, Adelina Miteva (2025) Assessment of the risk of electromagnetic emissions through monitoring for an object on the territory of the Metropolitan municipality, International scientific journal “Machines, Tehnologies, Materials”, 19(1), 22-24, p-ISSN 1313-0226, o-ISSN 1314-507X, <https://stumejournals.com/journals/mtm/2025/1/22>

Assessment of the risk of electromagnetic emissions through monitoring for an object on the territory of the Metropolitan municipality

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Abstract: In many cases, the importance of electromagnetic fields or the so-called "electromagnetic smog" on human health, living organisms, and the environment is ignored or at least minimized. The electromagnetic field (EMF) is a combination of invisible electric and magnetic fields with charge that occur in nature. Today, the impact of electromagnetic fields on the environment is increasing from human activities with the development and application of telecommunication technologies. Measurement, continuous monitoring, database creation, and evaluation of electromagnetic field parameters in urban environments are important aspects of optimizing EMF levels to achieve a healthy living environment. The paper presents an analysis and evaluation of electromagnetic radiation measurements from base stations of mobile operators, at one site, in a lightly urbanized urban environment over a certain time interval. Initial measurements showed exceeding the levels of electromagnetic emissions according to national legislation. During the repeated measurements, it was found that mobile operators, after correcting the radiation from base station antennas, have brought the radiation levels within the permissible limits. This underscores the necessity of ongoing monitoring.

Г8.14

Anna Bouzekova-Penkova, Dimitar Teodosiev (2025) Electromagnetic radiation in urban environments, сборник доклади от научна конференция "Знание, наука, иновации, технологии", 1103-1115; p-ISSN 2815-3472, CD- ISSN 2815-3480, <https://www.cceol.com/search/journal-detail?id=2883>

Индексирана в: CEEOL

Научна конференция „Знание, наука, иновации, технологии” 2025
ISSN 2815-3480 (CD)

ELECTROMAGNETIC RADIATION IN URBAN ENVIRONMENTS

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Abstract: The development of the telecommunications sector on a global scale in recent years has led to an oversaturation of the environment, especially urbanized areas, with technical sources of electromagnetic radiation (EMF). The issue of artificially created sources of electromagnetic fields, which impact the environment, plants, animals, and pose risks to human health, is becoming increasingly relevant. This study presents an analysis of measurement results for EMF from three base stations of two mobile operators in an object located in a highly urbanized area. The dynamics of EMF in the frequency range from 100 kHz to 7 GHz over a nine-day period were tracked. The obtained data confirm that the measured levels of electromagnetic fields are safe, in accordance with current national legislation ($\leq 10 \mu\text{W}/\text{cm}^2$) and European standards.

Г8.15

Димитър Теодосиев, Анна Бузекова-Пенкова, Юра Матвийчук, Гаро Мардиросян (2024) Оценка на електромагнитни излъчвания в диапазона от 100 kHz до 7 GHz в урбанизирана среда (столична община), Двадесета юбилейна международна научна конференция Космос, Екология, Сигурност – SES 2024, 236-241, p-ISSN 2603 – 3313

S E S 2 0 2 4
Twentieth Anniversary International Scientific Conference
SPACE, ECOLOGY, SAFETY
22 – 25 October 2024, Sofia, Bulgaria

ОЦЕНКА НА ЕЛЕКТРОМАГНИТНИ ИЗЛЪЧВАНИЯ В ДИАПАЗОНА ОТ 100 kHz ДО 7 GHz В УРБАНИЗИРАНА СРЕДА (СТОЛИЧНА ОБЩИНА)

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Ключови думи: околна среда, здраве, мониторинг, електромагнитно замърсяване, телекомуникации, урбанизирана среда.

Резюме: Електромагнитното замърсяване в условията на урбанизирана територия е много актуален проблем, свързан основно с развитието и усъвършенстване на мобилните комуникации. В работата е представен метод, апаратура и софтуер за получаване на информация за електромагнитните излъчвания и възможностите за експресен анализ на промените в техните характеристики в урбанизирана градска среда, за продължителни периоди от време. Анализирани и оценени са резултатите от проведените измервания в зависимост от местно време, разстояние от базовите станции, натоварване на мобилните мрежи и условията на околната среда.

Г8.16

Димитър Теодосиев, Анна Бузекова-Пенкова, Димитър Тонев, Елена Гелева, Божидар Славчев (2024) Оценка на специфичната активност на ^{14}C в стъкловъглеродни покрития след продължителен престой на международната космическа станция, “Space, ecology, safety” SES 2024, Двадесета юбилейна международна научна конференция „Космос, Екология, Сигурност“ SES 2024, 299-304, p-ISSN 2603 – 3313 e-ISSN 2603 – 3321

ОЦЕНКА НА СПЕЦИФИЧНАТА АКТИВНОСТ НА ^{14}C В СЪТКЛОВЪГЛЕРОДНИ ПОКРИТИЯ СЛЕД ПРОДЪЛЖИТЕЛЕН ПРЕСТОЙ НА МЕЖДУНАРОДНАТА КОСМИЧЕСКА СТАНЦИЯ

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Ключови думи: Графит, стъкловъглеродни покрития, космическа радиация, спътникови експерименти и специфична активност ^{14}C .

Резюме: Оценена е специфичната активност на космогенния радионуклид ^{14}C в два типа образци от спектрално чист графит, пресован и покрит със стъкловъглерод. "Космическите" образци са престояли в открития космос на повърхността на МКС за 28 месеца. Резултатите получени за "космическите" образци са сравнени с "референтни", направени от същия материал, съхранявани на Земята за същия период. Измерванията са извършени с течносцинтилационен спектрометър Packard Tri-Carb 2770 TR/SL. Установено е, че космическата радиация води до леко повишаване на съдържанието на ^{14}C в "космическите" образци. Това повишаване на съдържанието на ^{14}C не влияе върху характеристиките на стъкловъглеродните покрития, съответно върху вариациите на отделителната работа за електрона по техните повърхности и съответно върху точността на измерванията на електричните полета, с използване на такива сензори.

Г8.17

Димитър Теодосиев, Анна Бузекова-Пенкова (2022) Нови стъкловъглеродни покрития в сензори за спътникови системи и космически изследвания, Списание „Геодезия, Картография, Земеустройство“, бр. 3-4, 9-13, ISSN 0324-1610; https://geodesy-union.org/?page_id=1668

ФОТОГРАМЕТРИЯ, ЛАЗЕРНО СКАНИРАНЕ, СПЪТНИКОВИ ИЗСЛЕДВАНИЯ

НОВИ МАТЕРИАЛИ И ТЕХНОЛОГИИ ЗА СПЪТНИКОВИ СИСТЕМИ, КОСМИЧЕСКИ ИЗСЛЕДВАНИЯ И НАЗЕМНИ ПРИЛОЖЕНИЯ

Проф. д-р Димитър Теодосиев,
доц. д-р инж. Анна Бузекова-Пенкова, ИКИТ-БАН

SUMMARY

The applications of spherical sensors, with glassy-carbon coatings on their work surfaces, for measuring constant DC and variable AC electric fields from satellite systems, in the study of various physical processes in near-Earth plasma, using a new method of compaction and coating with GC. The development of the technology for the use of GC coatings in sensors for satellite experiments, including on board of the ISS and its advantages over other materials used for this purpose in various international satellite projects has been traced.

Keywords: processes in the ionospheric-magnetospheric plasma, sensors, satellite systems, electric fields, glassy carbon

РЕЗЮМЕ

Разгледани са приложенията на сферични сензори със стъкловъглеродни покрития на работните им повърхности за измерване на постоянни (DC) и променливи (AC) електрични полета от борда на спътници и спътникови системи, при изследване на различни физични процеси в околоземната плазма, с използването на един нов метод за уплътняване и покриване със СВ. Проследено е развитието на технологията за използване на СВ покрития в сензори за спътникови експерименти и системи, включително и на борда на МКС и нейните предимства, спрямо други материали, използвани за тази цел, в различни международни спътникови проекти.

важно да се осигури необходимата точност на измерванията, което поставя строги изисквания към качествата на използваните сензори. Това в много голяма степен се отнася и за качествата на използваните материали при изготвяне на сензорите, защото те трябва да работят в среда, характеризираща се с резки промени в температурата, концентрацията на околната плазма, потоците заредени частици, възможността за бомбардиране на работните им повърхности от микрометеорити, висок вакуум, специфични изисквания към вибрационни и ударни натоварвания и др.

В хода на развитие на техниките и методите за измерване на постоянни и променливи електрични полета в космическата плазма, са използвани различни материали за изработване на сензорите. Основното изискване към тези материали се определя от необходимостта да се увеличи точността и чувствителността на измерванията. Точността на измерванията на електрични полета, по метода на двойната сонда [1], [2], [5], [6], [14], [15], силно зависи от вариациите на функцията на отделителната работа за електроните по работните повърхности на сондите, вследствие на облъчването им със слънчева радиация в открития космос. Измервания на големината на отделителната работа за електроните по повърхностите на образци със стъкловъглеродни (СВ) покрития, или от монолитен стъкловъглерод, показват най-висока стойност (около 5,05 eV за монолитен СВ), което предполага малка фотоемисия, в сравнение с другите използвани по-рано материали (сребро, злато, аквадаг и др.) и осигурява

Г8.18

Anna Bouzekova-Penkova, Dimitar Teodosiev (2024) Spherical double sensors with glassy carbon coatings for electric fields measurement on board satellites, сборник доклади от научна конференция “Знание, наука, иновации, технологии”, 690-703; p-ISSN 2815-3472, <https://www.cceol.com/search/article-detail?id=1275382>

Индексирана в: CEEOL

SPHERICAL DOUBLE SENSORS WITH GLASSY CARBON COATINGS FOR ELECTRIC FIELDS MEASUREMENT ON BOARD SATELLITES

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Abstract: *Satellite measurements of electric fields depend on the precision and reliability of the performance of spherical double sensors. In this paper, the application of spherical double probes with glassy carbon coatings mounted on board a series of satellites, to study various physical processes taking place in the Earth's plasma is considered. The physicochemical properties of the glassy carbon coatings on the working surfaces of the probes were evaluated and it was found that they do not change after a long stay in the conditions of outer space.*

Г8.19

Димитър Теодосиев, Анна Бузекова-Пенкова (2022) Стъкловъглеродни покрития върху титанови сплави за приложения в космическите изследвания, научно списание „Механика, транспорт, комуникации“, том 20, бр.3/2, IX-21 – IX-26, p-ISSN 1312-3823 <https://mtc-aj.com/article.2256.bg.htm>

Индексирана в: ERIH PLUS



СТЪКЛОВЪГЛЕРОДНИ ПОКРИТИЯ ВЪРХУ ТИТАНОВИ СПЛАВИ ЗА ПРИЛОЖЕНИЯ В КОСМИЧЕСКИТЕ ИЗСЛЕДВАНИЯ

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Ключови думи: титанови сплави, стъкловъглеродни покрития, космически експерименти

Резюме: Титановите сплави са основни материали, използвани в многобройните космически проекти, с цел решаване на сложни научни и приложни задачи, при изследване на околоземното пространство. Условиата в открития космос налагат специфични технологични изисквания към материалите, от които са изработени космическите ракети, спътници, орбитални станции и научната апаратура, монтирана върху тях. В тази работа са представени и дискутирани резултати от проведени научни експерименти, с използване на елементи от титанови сплави, с покрития от стъкловъглерод, в спътникови прибори, за измерване на постоянни и променливи електрични полета. Анализа на представените резултати от проведен технологичен експеримент на борда на Международната Космическа Станция (МКС), за изследване влиянието на продължителния престой на стъкловъглеродни покрития в открития космос, върху техните механични и физико-химични характеристики, доказват техните изключителни качества и възможности за приложения при работа в екстремни условия, свързани с висок вакуум, резки температурни промени, потоци електрони и йони с висока енергия, галактичните космични лъчи, микрометеорити и други.

Г8.20

Димитър Теодосиев, Йордан Георгиев, Бойко Цинцарски, Анна Бузекова-Пенкова (2023) Стъкловъглеродни покрития върху композиционни керамични материали, метални сплави и графити – приложение в космическите изследвания, медицината и промишлеността, сборник от доклади от Годишна университетска научна конференция 2023 на НБУ „Васил Левски, 1405-1412, ISSN 2367-7481

**СТЪКЛОВЪГЛЕРОДНИ ПОКРИТИЯ ВЪРХУ
КОМПОЗИЦИОННИ КЕРАМИЧНИ МАТЕРИАЛИ,
МЕТАЛНИ СПЛАВИ И ГРАФИТИ – ПРИЛОЖЕНИЕ В
КОСМИЧЕСКИТЕ ИЗСЛЕДВАНИЯ, МЕДИЦИНАТА И
ПРОМИШЛЕНОСТТА**

**Димитър Теодосиев, Йордан Георгиев, Бойко Цинцарски,
Анна Бузекова-Пенкова**

**GLASSY CARBON COATINGS ON COMPOSITE
CERAMIC MATERIALS, METAL ALLOYS AND
GRAPHITES - APPLICATION IN SPACE RESEARCH,
MEDICINE AND INDUSTRY**

**Dimiter Teodosiev, Jordan Georgiev, Boyko Tsyntarski,
Anna Bouzekova-Penkova**

***Резюме:** Тази работа разглежда приложенията на покрития от стъклообразен въглерод и получаването на слоеве от същия материал върху различни видове огнеупорни материали, с дебелини не по-големи от 25 микрона. Технологията е използвана за изработване на елементи със специално предназначение, в медицината, за графитни касети за режещи инструменти, твърдосплавни пластини, графитови подложки използвани при епитаксиално израстване и производството на интегрални схеми и други приложения.*

Г8.21

Димитър Теодосиев, Анна Бузекова – Пенкова, Деница Борисова (2024) Измерване на ULF/VLF електрични полета от борда на спътници за изследване на ефекти в околоземната плазма, свързани със сеизмична активност, Списание „Геодезия, Картография, Земеустройство“, бр. 3-4, 15-17, ISSN 0324-1610, <https://viewer.joomag.com/%D0%A1%D0%BF%D0%B8%D1%81%D0%B0%D0%BD%D0%B8%D0%B5-%D0%93%D0%9A%D0%97-3-42024/0456820001726156616?short&>

ФОТОГРАМЕТРИЯ, ЛАЗЕРНО СКАНИРАНЕ, СПЪТНИКОВИ ИЗСЛЕДВАНИЯ

ИЗМЕРВАНЕ НА ULF/VLF ЕЛЕКТРИЧНИ ПОЛЕТА ОТ БОРДА НА СПЪТНИЦИ ЗА ИЗСЛЕДВАНЕ НА ЕФЕКТИТЕ В ОКОЛОЗЕМНАТА ПЛАЗМА, СВЪРЗАНИ СЪС СЕЙСМИЧНАТА АКТИВНОСТ

Проф. д-р Димитър Теодосиев, доц. д-р инж. Анна Бузекова-Пенкова,
проф. д-р инж. Деница Борисова, ИКИТ-БАН

SUMMARY

In the present work, the qualities and possibilities of applying spherical probes with glassy carbon coating on their working surface, for measuring electric fields in the Earth's plasma, are considered. The accuracy of the measurements and the ability to observe the fine structure of the ULF/VLF waves allows them to be successfully applied to satellites, the main task of the research is electromagnetic warnings of earthquakes, as well as other large-scale natural disasters and environmental catastrophes related with processes taking place in the Earth's plasma and on the Earth's surface.

Keywords: processes in the ionospheric-magnetospheric plasma, sensors, satellite systems, electric fields, glassy carbon.

РЕЗЮМЕ

Разгледани са качествата и възможностите за прилагане на сферични сонди със стъкловъглеродно покритие на работната им повърхност, за измерване на електрични полета в околоземната плазма. Точността на измерванията и възможността за наблюдаване на фината структура на ULF/VLF вълни позволява да бъдат успешно прилагани на спътници, чиято основна задача е изследване на електромагнитни предвестници на земетресения, а също и на други мащабни природни бедствия и екологични катастрофи, свързани с процеси, протичащи в околоземната плазма и върху земната повърхност.

наблюдавани на някои места преди определени земетресения, не е установено, че те не предшества последователно ударни моменти на земетресение. Записаните данни също така обикновено съдържат вариации, дължащи се на много едновременни и обикновено неизбежни промени в околната среда, несвързани със земетресения, като например валежи, промени в барометричното налягане, изкуствени електромагнитни емисии, изпомпване на подземни води и много други. По този начин намирането на предупредителни сигнали, които могат да бъдат универсално и надеждно използвани за междинни и краткосрочни прогнози, е изключително трудно.

Методите за спътников мониторинг на явленията, протичащи в области в непосредствена близост до епицентъра на големи земетресения, в комбинация с комплекс от наземни измервания, са много полезни за изучаването на сеизмо-електромагнитните явления, свързани с процесите в сеизмично-активната зона. На тази основа се разработват редица международни космически проекти. Тяхната основна практическа цел е да се създаде ефективна система за наблюдение, предсказване и управление на бедствия, свързани с протичащи силни земетресения. Част от тези космически проекти са свързани с разработването на микроспътници [1], носещи на борда си специализирана апаратура за измерване и предаване на данни за плазмените параметри и електромагнитните емисии в околоземната плазма до Земята. Наблюдението на сеизмичната активност на Земята включва не само регистрирането на силни сеизмични удари и техните разрушителни последствия, а

Г8.22

Анна Бузекова-Пенкова (2024) Съвременни алуминиеви сплави използвани в авиацията и космическото пространство, сборник доклади от научна конференция “Знание, наука, иновации, технологии”, 704-716; p-ISSN 2815-3472, <https://www.cceol.com/search/article-detail?id=1275383>

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СЪВРЕМЕННИ АЛУМИНИЕВИ СПЛАВИ ИЗПОЛЗВАНИ В АВИАЦИЯТА И КОСМИЧЕСКОТО ПРОСТРАНСТВО

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Абстракт: *Алуминиевите сплави са основният материал за структурните части на въздухоплавателните средства поради техните високи специфични свойства, намалено тегло, отлични характеристики на умора и устойчивост на корозия. Алюминият е сравнително евтин, лек метал, който може да бъде термично обработен и натоварен до относително високо ниво на напрежение. Лесно обработваем е, което води до по-ниски разходи за производство и поддръжка. В този кратък преглед ще се съсредоточим накратко върху нарастващите приложения на някои от съвременните алуминиеви сплави използвани в авиацията и космическите апарати.*

Г8.23

Анна Бузекова-Пенкова (2023) Влияние на космическото пространство върху материалите и оборудването на космическите апарати, сборник от доклади от Годишна университетска научна конференция 2023 на НБУ „Васил Левски, 8-9.06.2023 г., Велико Търново, България, 1413-1420, ISSN 2367-7481

ВЛИЯНИЕ НА КОСМИЧЕСКОТО ПРОСТРАНСТВО ВЪРХУ МАТЕРИАЛИТЕ И ОБОРУДВАНЕТО НА КОСМИЧЕСКИТЕ АПАРАТИ

Анна Бузекова-Пенкова

INFLUENCE OF SPACE ON SPACECRAFT MATERIALS AND EQUIPMENT

Anna Bouzekova-Penkova

Резюме: Докладът предоставя информация за въздействието на космическата радиация върху оборудването и материалите от които са изработени космическите апарати. Разглежда ефектите, които възникват в резултат на облъчването в материалите. Формулира основните задачи за осигуряване на безопасна работа на космическите апарати при изучаване на космическото пространство в съвременността и бъдещето.

Г8.24

Анна Бузекова-Пенкова (2023) Корозия на алуминий и алуминиеви сплави, Деветнадесета международна научна конференция „Космос, Екология, Сигурност“ SES 2023, 323-327, ISSN 2603 – 3313

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КОРОЗИЯ НА АЛУМИНИЙ И АЛУМИНИЕВИ СПЛАВИ

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Ключови думи: корозия, алуминий, алуминиеви сплави

Резюме: В така представения доклад са разгледани видовете корозия, които се срещат при алуминия и алуминиевите сплави. Описани са причините за появата на вида корозия водещи до разрушаване на материала.

Г8.25

Anna Bouzekova-Penkova (2024) Protection of aluminum and aluminum alloys from corrosion, International scientific journal “Machines, Tehnologies, Materials”, 18(5), 180-182, p-ISSN 1313-0226, <https://stumejournals.com/journals/mtm/2024/5>

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Protection of aluminum and aluminum alloys from corrosion

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Abstract: This paper examines corrosion protection techniques for aluminum alloys, focusing on traditional and innovative surface treatment methods. Aluminum alloys are applicable in many industries due to their advantages derived from the good combination of chemical, physical, and mechanical properties. However, they are susceptible to various forms of corrosion, which can critically compromise the structure of the component and lead to damage that does not ensure safe operation. Coatings are necessary for the durability and effective protection of aluminum and its alloys from corrosion, ensuring safe and long-term operation of components in aggressive environments.

Г8.26

Анна Бузекова-Пенкова (2024) Приложение на алуминия в железопътната индустрия, научно списание „Механика, транспорт, комуникации“ том 22, бр.3/2, IX-8 – IX-13, p-ISSN 1312-3823, <https://mtc-aj.com/library/2492.pdf>

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ПРИЛОЖЕНИЕ НА АЛУМИНИЯ В ЖЕЛЕЗОПЪТНАТА ИНДУСТРИЯ

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Ключови думи: алуминий, алуминиеви сплави, железопътен транспорт

Резюме: Този доклад предоставя кратък преглед на видовете алуминиеви сплави, използвани в железопътната индустрия. Алуминият и алуминиевите сплави са материалите, които допринасят за бързото развитие и модернизация на отрасла поради олекотяване на железопътните превозни средства. Олекотената конструкция позволява на влака да ускорява и забавя по-ефективно. Транспортира повече полезни товари при по-ниски разходи, намалява натоварването на железопътните релси и намалява тяхното износване. Освен че е лек, здрав и издръжлив, алуминият е много ценен в изграждането на товарни вагони. Той е биологично неутрален, лесен за поддръжка и не взаимодейства с товара при транспортиране. За транспортиране на зърно и други хранителни товари алуминият е важен от гледна точка на хигиенните свойства на материала. Корозионната му устойчивост позволява превозването на агресивни товари в химически резервоари и минерални бункери.

Г8.27

Анна Бузекова-Пенкова (2024) Алюминий и алуминиеви сплави във високоскоростния железопътен транспорт, научно списание „Механика, транспорт, комуникации“, том 22, бр.3/2, IX-14 – IX-19, p-ISSN 1312-3823, <https://mtc-aj.com/library/2493.pdf>

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АЛУМИНИЙ И АЛУМИНИЕВИТЕ СПЛАВИ ВЪВ ВИСОКОСКОРОСТНИЯ ЖЕЛЕЗОПЪТЕН ТРАНСПОРТ

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Ключови думи: алуминий, алуминиеви сплави, високоскоростни влакове, железопътен транспорт

Резюме: През последните десетилетия алуминият и алуминиевите сплави се превърнаха в незаменими материали в производството на високоскоростни влакове. Тяхното леко тегло, здравина, издръжливост и устойчивост на корозия осигуряват по-лека конструкция на високоскоростните влакове, увеличаване на скоростта, надеждността и енергийната ефективност. Използването им води до намаляване на разходите за производство и поддръжка, което ги прави предпочитан материал за бъдещо производство на високоскоростни влакове. Този доклад предоставя кратък преглед на видовете алуминиеви сплави, използвани във високоскоростния железопътен транспорт.

Г8.28

Аделина Митева, Анна Бузекова-Пенкова (2024) Приложение на вторичните алуминиеви сплави в железопътния транспорт, сборник от доклади от Годишна университетска научна конференция 2024 на НБУ „Васил Левски, 711-720, ISSN 2367-7481

ПРИЛОЖЕНИЕ НА ВТОРИЧНИТЕ АЛУМИНИЕВИ СПЛАВИ В ЖЕЛЕЗОПЪТНИЯ ТРАНСПОРТ

Аделина Митева, Анна Бузекова-Пенкова

APPLICATION OF SECONDARY ALUMINUM ALLOYS IN RAILWAY TRANSPORT

Adelina Miteva, Anna Bouzekova-Penkova

***Резюме:** Вторичните алуминиеви сплави се използват все по-широко, но недостатъчно, в железопътните транспорт и системи. В работата са дадени конкретни примери за такива приложения. Подчертани са предимствата и потенциала на вторичните алуминиеви сплави за цялостна устойчивост. Разгледани са и бъдещите изследователски насоки в това направление - екологичност и устойчивост в железопътния транспорт.*

Г8.29

Аделина Митева, Анна Бузекова-Пенкова (2024) Приложения на вторични алуминиеви сплави в автомобилната индустрия, сборник доклади от научна конференция “Знание, наука, иновации, технологии”, 717-728, ISSN 2815-3472, <https://www.cceol.com/search/article-detail?id=1275384>

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ПРИЛОЖЕНИЯ НА ВТОРИЧНИ АЛУМИНИЕВИ СПЛАВИ В АВТОМОБИЛНАТА ИНДУСТРИЯ

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***Анотация:** Вторичните алуминиеви сплави, получени от рециклирани материали, предлагат екологични и устойчиви алтернативи в автомобилната индустрия. Тези сплави осигуряват намалено тегло, подобрена обработваемост и благоприятно въздействие върху околната среда. Статията преглежда употребите на вторични алуминиеви сплави в автомобилостроенето, подчертавайки техния потенциал за цялостна устойчивост. Практическите примери и бъдещи изследователски насоки са обсъдени, подчертавайки необходимостта от оптимизиране на използването на тези сплави в различни автомобилни компоненти.*

Анна Бузекова-Пенкова (2024) Приложения на вторични алуминиеви сплави в морския и обществен транспорт, сборник от доклади от Годишна университетска научна конференция 2024 на НВУ „Васил Левски, 701-710, ISSN 2367-7481

ПРИЛОЖЕНИЯ НА ВТОРИЧНИ АЛУМИНИЕВИ СПЛАВИ В МОРСКИЯ И ОБЩЕСТВЕН ТРАНСПОРТ

Анна Бузекова-Пенкова

APPLICATIONS OF SECONDARY ALUMINUM ALLOYS IN MARINE AND PUBLIC TRANSPORT

Anna Bouzekova-Penkova

***Резюме:** Вторичните алуминиеви сплави предлагат екологични и устойчиви алтернативи в морския и обществен транспорт. Тези сплави осигуряват намалено тегло, подобрена обработваемост и благоприятно въздействие върху околната среда. Статията преглежда употребите на вторичните алуминиеви сплави в морския и обществен транспорт, подчертавайки техния потенциал за цялостна устойчивост. Практически примери и бъдещи изследователски насоки са обсъдени.*