МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
БУКОВИНСЬКИЙ ДЕРЖАВНИЙ МЕДИЧНИЙ УНІВЕРСИТЕТ»

М А Т Е Р І А Л И

105-ї підсумкової науково-практичної конференції
з міжнародною участю
професорсько-викладацького персоналу
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Матеріали підсумкової 105-ї науково-практичної конференції з міжнародною участю професорсько-викладацького персоналу Буковинського державного медичного університету, присвяченої 80-річчю БДМУ (м. Чернівці, 05, 07, 12 лютого 2024 р.) – Чернівці: Медуніверситет, 2024. – 477 с. іл.

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У збірнику представлені матеріали 105-ї підсумкової науково-практичної конференції з міжнародною участю професорсько-викладацького персоналу Буковинського державного медичного університету, присвяченої 80-річчю БДМУ (м. Чернівці, 05, 07, 12 лютого 2024 р.) із стилістикою та орфографією у авторській редакції. Публікації присвячені актуальним проблемам фундаментальної, теоретичної та клінічної медицини.

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pyrrolidone), Poly (glycolic acid). Example. PVA/ Poly (acrylic acid) hydrogels were tested on condylar osteochondral (OC) defects in a New Zealand white rabbit model for 12 and 24 weeks for possible use for articular cartilage tissue engineering.

4) PVA-bioceramics–based hydrogels (bioceramics – Hydroxyapatite, Calcium phosphate and magnesium phosphate). Example. Matrix of PVA- Hydroxyapatite (HAp)– based hydrogels mediated precipitation of HAp particles produced an ordered three dimensional assembly of the particles for potential use in the healing of bone defects.

Conclusions. PVA-based hydrogel shave significant prospects in the development of tissue engineering.

Gutsul O.V.

STRUCTURAL FEATURES AND ELECTROCONDUCTIVE PROPERTIES OF MXENES THIN FILMS

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Introduction. Over the past decade, MXenes have attracted increasing attention due to their unique properties, such as two-dimensional (2D) microstructure, metallic conductivity, surface hydrophilicity and a wide range of applications from biomedicine to energy technologies (*A. Sohan, 2021*). MXenes represent a new class of two-dimensional materials that can be described by the general formula $M_{n+1}X_nT_x$, where M is a transition metal, X is carbon or nitrogen, and T is a surface functional group (-OH, -O and/or -F) (*M. Alhabeb, 2017*). MXenes exhibit remarkable electrical and mechanical properties compared to other nanomaterials (*H. Tang, 2021*). Recent studies of Ti_3C_2-type MXenes have shown the highest electrical conductivity (15000-20000 S/cm) (*N. Driscoll, 2021*). Impedance spectroscopy is used as an effective method for studying the electrical characteristics of electronic device interfaces in a wide frequency range (*H.S. Magar, 2021; I. Mora-Seró, 2009*). Surface layer resistivity and charge transfer capacitance are evaluated as important material properties that are commonly used to characterize materials and develop thin-film devices such as perovskite solar cells or organic LEDs.

The aim of the studyis to determine the correlation between the electrical conductivity of structures obtained by the spin-coating method based on DMF-MXenes and NMP-MXenes on a sensor platform with gold interdigitated electrodes (IDEs) by electrical impedance spectroscopy.

Material and methods. A scanning electron microscope (SEM, MAIA3 Tescan) was used to characterize the surface morphology of the prepared samples. An IM 3536 LCR METER Hioki instrument was used to measure the impedance spectra. To overcome the limitations of the aqueous MXenes suspension, Ti_3C_2-type MXenes thin films were prepared from non-aqueous suspensions in N,N-dimethyl formamide (DMF) and N-methyl-2-pyrrolidone (NMP) using the solvent exchange method, followed by spin-coating on gold IDEs.

Results. MXenes in DMF showed less wettability of the IDE sensor, which led to a denser morphology than MXenes in NMP, as confirmed by SEM images. The thickness of the deposited MXenes on the surface of the gold electrode was evaluated by 3D laser microscopy ~1 μm. The thicknesses of DMF-MXenes and NMP-MXenes films were similar according to this method. Thus, when evaluating the electrical conductivity of the films, their thickness could be neglected. The electrical properties of the films studied by impedance spectroscopy in the frequency range of 4 Hz - 8 MHz showed that DMF-MXenes layers exhibit higher electrical conductivity than MXenes deposited from NMP. In terms of their lower series resistance at the IDE (66.2 Ω) as well as lower charge transfer resistance to the electrodes (4.66 Ω). They also showed a higher double layer capacitance (5 pF). These properties can be attributed to the successful intercalation of MXenes with DMF organic molecules, which contributes to the charge transfer rate in the near-electrode double electric layer, as well as to the different chemistry of MXenes in DMF and NMP suspensions.

Conclusions. Thus, the material technology and electrical properties of MXenes thin films made from non-aqueous solvents are promising for the possible use of MXenes as charge transport

layers in organic-based photovoltaic devices.

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DEVELOPMENT OF STATISTICAL ANALYSIS SOFTWARE

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Introduction. Statistical analysis plays a pivotal role in modern medical research by providing the means to extract meaningful insights from vast and complex datasets. It allows researchers to identify patterns, correlations, and statistically significant findings, which are essential for evidence-based decision-making in healthcare. Moreover, statistical analysis helps ensure the reliability and validity of research findings, ultimately improving the quality of medical research and its impact on patient care and treatment outcomes.

The aim of the study. This paper focuses on the development of statistical analysis software specifically tailored for medical scientific research.

Material and Methods. Statistical software was built by using Google tables.

Results. The main advantage of the developed software is its ability to analyze big data sets. Using the proposed software, one can input information about several tens of laboratory indicators from two researched groups and apply statistical tests to all indicators at once.In addition to descriptive statistics, which includes mean, median, standard deviation, and interquartile range, there are a number of parametric and nonparametric tests available in the software. Parametric tests are represented by paired and non-paired t-tests, ANOVA, while nonparametric tests include the Wilcoxon, Mann-Whitney and Kruskal-Wallis tests. For correlation analysis, one can use Pearson, Spearman, and Kramer correlation. For nonnumerical data, the software provides odds ratio, chi-squared test and Fisher's exact test.

Conclusion. Thedeveloped statistical analysis software is a powerful tool for medical research, offering the capability to handle large datasets and a wide range of statistical tests for both numerical and nonnumerical data.

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PROSPECTS FOR MEDICAL APPLICATIONS OF HYPERSPECTRAL IMAGING

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Introduction. A hyperspectral image (HSI) is an array of two-dimensional images of objects that contains information about each point of objects in a wide spectrum of electromagnetic radiation. HIS is used in many fields. All uses are united by the fact that this scanning mode allows you to identify and display the spatial distribution of the studied substances in objects. The physical basis for the identification of substances is that each substance has a unique set of frequencies in the optical absorption spectra – the so-called optical fingerprint. However, different substances exhibit their optical fingerprints in different parts of the electromagnetic spectrum. That is why the technique of HSI involves obtaining images in a wider spectral range than visible.

The aim of the study.To review the existing applications of hyperspectral research in medicine and, based on the physical limitations of equipment and mathematical limitations of processing methods, to outline possible prospects for the use in medicine.

Material and methods. In medicine, the ability to identify and visualize the distribution of substances makes it possible to obtain the diagnostic information about the composition, morphology and physiological processes in the tissues of the human body. This is used in non-invasive methods of diagnosis and support of surgical operations. The light inside the biological tissues is repeatedly reflected by the inhomogeneities of biological structures and is eventually absorbed mostly by melanin, water, fats, and hemoglobin. One of the technique’slimitations is that depth of penetration of light into biological tissues differswith wavelength. The penetration depth depends on the light absorption degree by substances during its propagation. Substances selectively absorb light, which makes it possible to detect their presence in a biological object. In the IR range,