**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**
**БУКОВИНСЬКОГО ДЕРЖАВНОГО МЕДИЧНОГО УНІВЕРСИТЕТУ**
**присвяченої 80-річчю БДМУ**
**05, 07, 12 лютого 2024 року**

Конференція внесена до Реєстру заходів безперервного професійного розвитку, які проводитимуться у 2024 році № 3700679

**Чернівці – 2024**

УДК 001:378.12(477.85)
ББК 72:74.58
М 34

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.

ББК 72:74.58

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.



ISBN 978-617-519-077-7

**Results**. The utilization of bone plates in fracture management has yielded several important findings: Fracture Stability: Bone plates provide exceptional stability, which is crucial for a successful healing process. This stability reduces pain and minimizes the risk of further complications. Enhanced Healing: The use of bone plates has been shown to promote faster and more efficient fracture healing. This is especially evident in complex fractures where stabilization is paramount. Improved Functional Outcomes: Patients who receive bone plates generally experience better functional outcomes, regaining a higher degree of mobility and function in the affected limb. Material Matters: The choice of bone plate material influences the overall success of the procedure. Titanium plates, for instance, offer the advantage of being both lightweight and strong. Age and Health: The patient's age and overall health significantly impact the healing process. Younger, healthier patients tend to have quicker recoveries.

**Conclusions.** Bone plates are invaluable tools in the field of orthopedics for managing fractures. Their stability, ability to promote healing, and positive impact on functional outcomes make them a key component of fracture treatment. The choice of material and the surgical procedure are vital factors in ensuring the success of the treatment. However, patient-specific factors, such as age and overall health, also play a significant role in the overall success of the procedure. In conclusion, the use of bone plates in fracture management has revolutionized the way orthopedic surgeons approach fractures. By understanding their importance and optimizing their application, medical professionals can continue to enhance patient outcomes and contribute to the overall well-being of patients with fractures.

**Nahirniak V.M.**

## PROGRAMMING LANGUAGES AND DEVELOPMENT OF AI FOR MEDICINE

*Department of Biological Physics and Medical Informatics*
*Bukovinian State Medical University*

**Introduction**. Artificial intelligence (AI) is a branch of applied computer science wherein computer algorithms are trained to perform tasks typically associated with human intelligence. Artificial intelligence is intelligence in perceiving, synthesizing, and inferring information which is demonstrated by machines or computers. It is opposite to intelligence displayed by humans.

**The aim of the study.** Based on the examples of the use of AI for medical tasks, we would like to demonstrate the potential of AI in this field. Obviously, tasks must include communication with patients, language and speech recognition, computer vision, translation between (natural) languages, as well as other mappings of input data. AI should also analyze the patient’s medical history and conduct the verification of a patient. Preliminary examination and consultation of a patient conducted by AI would save time and smooth the overloaded workflow in a hospital. Addressing a patient to a proper doctor is a crucial step in medical treatment and AI may play a significant role in this.

**Material and methods.** Machine learning and artificial neural networks are two major concepts in the AI current research. Machine learning means the study of algorithms by a computer that improves automatically through experience. In order to develop these algorithms and build neural networks many programming languages can be employed. Python and Java are among them. Although Python was created in early 90’s and before AI became crucial to businesses, it’s one of the most popular languages for artificial intelligence. One of the main reasons Python is so popular within AI development is that it was created as a powerful data analysis tool and has always been popular within the field of major data.

**Results**. The most important reason why Python is always ranked near the top is that there are AI-specific frameworks that were created for the language. One of the most popular is Tensor Flow, which is an open-source library created specifically for machine learning and can be used for training and inference of deep neural networks. Other AI-centric frameworks includes cikit-learn for training machine learning models, Py Torch for visual and natural language processing, The PyDICOM library is a mature library offering a reliable, simple reading and writing of DICOM files from python code. It has been actively developed over several years and has a solid base of users in imaging and therapy projects. Popularity of mobile applications require proper language. And JAVA is a perfect match. The Java machine learning library provides several machine learning algorithms, and the Neuroph makes it possible to design neural networks.

**Conclusions**. Currently, AI is the most popular digital information industry. This also includes the dynamic medical industry. Current developments in Python and JAVA demonstrate that these languages suit well for the need of progressing medical industry. There are several pilot projects on the implementation of AI technologies in clinical centers of the UK and USA. It will attract more companies, more funds for development of software programs, electronic devices, mobile applications, home use gadgets etc.

**Tkachuk I.G.**

## SnS/P-InSe THIN FILM STRUCTURES

*Department of Biological Physics and Medical Informatics*
*Bukovinian State Medical University*

**Introduction.** In the modern world of semiconductor materials there is an active phase of research and obtaining new materials for use in thin-film solar cells and various types of electronic sensors. The main condition of the researches is the simplicity, cheapness of production and quantity of this material in the natural environment. Tin monosulfide SnS is a promising semiconductor material for optoelectronic applications with a band gap of 1.2÷1.6 eV and a high absorption coefficient. In addition, SnS is an environmentally safe and potentially affordable photovoltaic material.

**The aim of the study.** Creation of p-SnS/n-InSe heterojunction for implementation in laser technologies.

**Material and methods.** P-SnS/n-InSe heterojunctions were produced by the method of low-temperature spray pyrolysis. The advantage of this technology lies in its simplicity and cheapness. An aqueous solution of the appropriate composition was sprayed onto the InSe substrate, which was placed on the heater. The substrate was made of single-crystal n-InSe grown by the Bridgman method. Thin films of tin sulfide SnS with a thickness of 0.5 μm were made from a 0.1 M aqueous solution of tin dichloride $SnCl_2$ $2H_2O$ and $(NH_2)_2CS$ (99%). The solution was prepared in bidistilled water, the ratio of components [Sn]:[S] was equal to 1:3, which was provided by the appropriate solvent of molar masses of chemical reagents that participated in the formation of the film on the surface of the InSe substrate during pyrolysis. The pyrolysis temperature for obtaining the film was T = 796 K, the specific resistance of the film was ρ = 50 kΩ cm.

**Results.** At small direct displacements V = 0÷1 V, the graphical dependence can no longer be described by a formula,

$$I = I_s\left[\exp\left(\frac{e(V - IR_s)}{nkT}\right) - 1\right] + \frac{V - IR_s}{R_{sh}}$$

but a power-law dependence I = a•V m is observed, where m ≈ 1.5 for T < 294 K and m ≈ 1 for T > 294 K. We assume, that the value m ≈ 1.5 indicates the dominance of the current limited by the space charge in the ballistic regime (Child-Langmuir law), and m ≈ 1 is due to the current flowing through the shunt resistance. Thus, with increasing temperature at small direct displacements, the shunt resistance begins to play a decisive role in charge transfer. The spectral dependence of the quantum efficiency of the p-SnS/n-InSe heterostructure irradiated from the side of the SnS film is in the photon energy range of 1.2÷3.2 eV with a maximum at 1.45 eV, which corresponds to the SnS band gap. The long-wavelength edge of photosensitivity at hν = 1.2 eV is caused by the fundamental absorption edge in n-InSe. P-SnS thin films are polycrystalline, as a result of which the eigenabsorption edge is blurred due to the partial absorption at the grain boundaries compared to single-crystalline materials.

**Conclusions.** A photosensitive p-SnS/n-InSe heterojunction was produced by the method of low-temperature spray pyrolysis. I was measured in the temperature range from 247 K to 333 K at