analyzer. A glassy carbon electrode (GCE) was used as an indicator electrode. Silver chloride electrodes were used as auxiliary and reference electrodes. A 0.1 Methanol solution of sodium perchlorate was used as the background electrolyte. The solvent DMFA was selected in accordance with the Pharmacopoeia article.

Cyclic voltammograms were recorded in the potential range from 0.7 to 2 V (Fig. 2). According to the data obtained, it can be seen that IML undergoes the process of electrochemical oxidation at the electrode, while the peak of electrochemical reduction is absent.

As was shown in the figure 2, the current of IML electrooxidation is proportional to its concentration in solution and may be used for the determination of the substance in pharmaceuticals. The IR spectrum in KBR was recorded for confirmation of IML

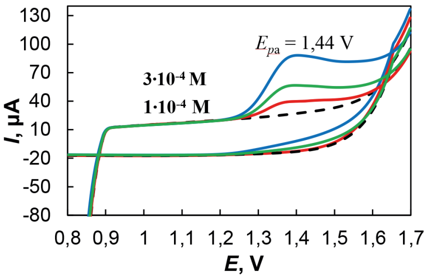

Fig. 2. *Cyclic voltammograms of IML on the GCE in 0.1 M $NaClO_4$, W = 100 mV/s*

originality. Infrared spectrometer Agilent Technologies Cary 600 was used for this purpose. Absorption bands position was of obtained spectrum is the same as in the pharmacopoeia article (Fig. 3).

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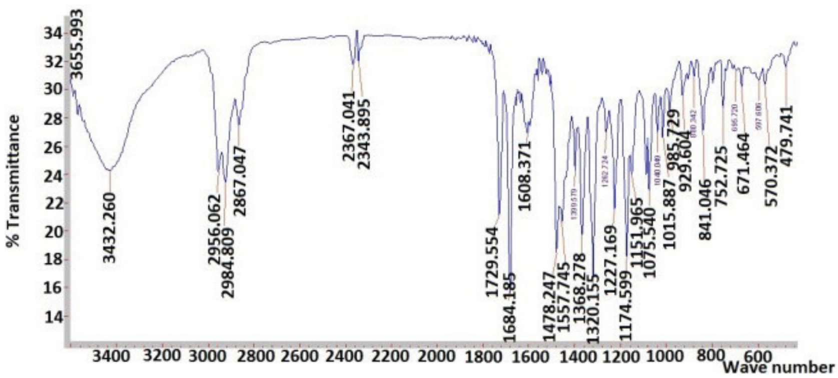

Fig. 3. *IR spectrum of IML*

References

1. *Parajuli R., Pokhrel P., Lamichane S., Shrestha S. // J. Drug Del. Therap., 2015. – V. 5. – №3. – P. 5–9. https://doi.org/10.22270/jddt.v5i3.1140.*

LASER TREATMENT OF FACE MASKS: A STEP FORWARD IN PERSONAL RESPIRATORY PROTECTION

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In 2020 humanity faced the new pandemic of COVID-19. Currently, the scientific community is aiming its efforts to develop new approaches for personal protection against viral and also bacterial infections. The most effective weapon against the COVID is a vaccine. But it is selective to each type of virus, takes time for development, and has high costs. Moreover, there is no warranty whatsoever that vaccines will provide immunity against new viruses. This is not the case for facemasks that protect not just against viruses but also against bacteria that are a secondary cause of death due to respiratory infections. Taking this into account, protective clothes used as facemasks provide an accessible way for personal safety [1]. However, conventional textiles offer very limited protection to the user since their main role according to the World Health Organization is to protect people around from infections the facemask wearer could transmit without wearing one. Thus, in this contribution we will discuss a versatile textile treatment for the facemasks that offer significant improvements over other strategies reported until now [2, 3, 4]. We accomplished this feat by the laser-integration of graphene oxide and metallic nanoparticles textiles. The synergetic antibacterial properties of Ag nanoparticles and the enhanced filtration properties of laser-reduced graphene showed that textiles can be made with improved performance [5, 6]. Our work has significant implications in health care and our battle against transmittable respiratory diseases by offering an inexpensive and scalable way to provide antibacterial and filtration properties to facemasks.

In this work, we develop a new approach for the laser treatment of reusable protective face masks decorated with immobilized AgNP. This combination increases filtration and antibacterial efficiency of masks via properties synergism of graphene and silver. Laser treatment is a cheap and scalable method that allows creating patterns of any form and control the properties of the material by adjusting the beam power.

References

1. *Karmacharya M., Kumar S., Gulenko O. & Cho Y.-K. Advances in Facemasks during the COVID-19 Pandemic Era. ACS Appl. Bio Mater. (2021) doi:10.1021/acsabm.0c01329.*
2. *Huang L. et al. Self-Reporting and Photothermally Enhanced Rapid Bacterial Killing on a Laser-Induced Graphene Mask. ACS Nano 14, 12045–12053 (2020).*
3. *Kowalczyk D. et al. Modification of cotton fabric with graphene and reduced graphene oxide using sol-gel method. Cellulose 24, 4057–4068 (2017).*
4. *Zhong H. et al. Plasmonic and Superhydrophobic Self-Decontaminating N95 Respirators. ACS Nano 14, 8846–8854 (2020).*
5. *Palmieri V. & Papi M. Can graphene take part in the fight against COVID-19? Nano Today 33, 100883 (2020).*
6. *Wang H. et al. Laser Writing of Janus Graphene / Kevlar Textile for Intelligent Protective Clothing. ACS Nano 14, 3219–3226 (2020).*

INVESTIGATION OF THE ELECTROCHEMICAL PROPERTIES OF INDOMETHACIN FOR ITS QUANTITATIVE DETERMINATION

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Currently, a large number of drugs are classified as non-steroidal anti-inflammatory drugs (NSAID). One of the common and available NSAIDs is indomethacin (IMN), a derivative of indoleacetic acid. It has anti-inflammatory, analgesic, and antipyretic effects [1].

The purpose of this work is to select the conditions for the electrochemical determination of IMN for the subsequent development of a technique for its quantitative determination in drugs by voltammetry.

Electrochemical experiments were performed with TA–2 voltammetric analyser (OOO RPE Tomanalit, Tomsk, Russia). A glassy carbon electrode was used as an indicator electrode. Silver chloride electrodes were used as an auxiliary and reference,