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I МІЖНАРОДНА НАУКОВО-ПРАКТИЧНА КОНФЕРЕНЦІЯ "ІНФОРМАЦІЙНІ СИСТЕМИ ТА ТЕХНОЛОГІЇ В МЕДИЦИНІ"

ЗБІРНИК НАУКОВИХ ПРАЦЬ

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МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ

ХАРКІВСЬКИЙ НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ РАДІОЕЛЕКТРОНІКИ

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ЗБІРНИК
НАУКОВИХ ПРАЦЬ
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«ІНФОРМАЦІЙНІ СИСТЕМИ ТА ТЕХНОЛОГІЇ В МЕДИЦИНІ» (ISM–2018)

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that provide feedback to the system when recognizes changes in current and send it to microprocessor to stop working when sensing unwanted mounting of leakage current pass through cannula (Fig. 2).

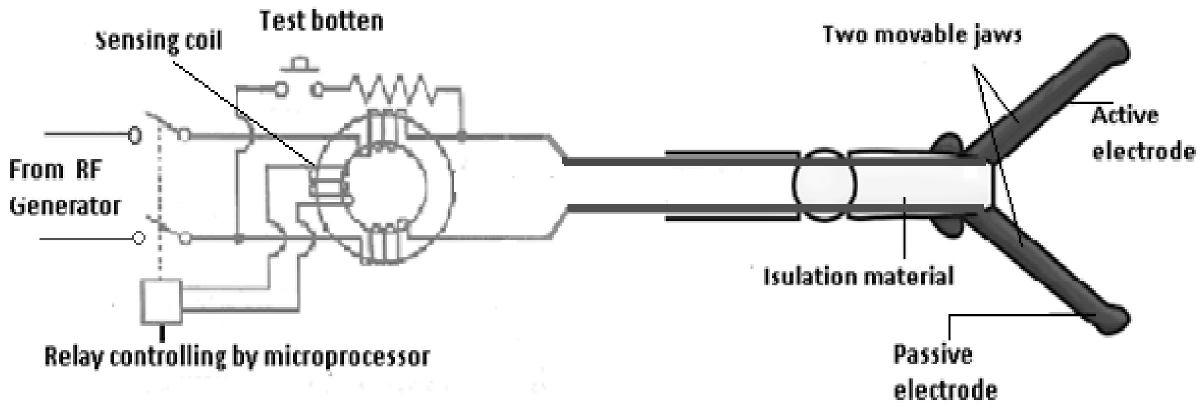

Figure 2 – Structure of system for monitoring stray high frequency energy during electrosurgical procedure

Actually comprise two separate electrodes active and passive electrode current, that allows for sensing coil to detection the different of the current between what they send and what they should receive and taking in consideration the mounting of energy consumption in cutting and coagulation over relay, by measuring and comparing the different in the current microprocessor can discover the leakage current and stop generator.

By modelling this technique on the Mathlab we found this technique can monitoring as well as protect against high frequency current by shut out the source of power and give audio alarm there is leakage current detected , the system return back to work when the source of problem disappear.

Related to the good results what we get from applied new techniques, proposed system makes possible to applied new technique in the output of electrosurgical unit before laparoscopic hand pieces electrodes or cable to reduce the effect of harmful high frequency current. Which reduces Unintended tissue damage resulting burns and can cause patient injury, serious post-operative complications or death.

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IMAGE-SERIES ANALYSIS FOR RECRYSTALLIZATION PROCESS EVALUATION

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Developed software for analyzing the process of recrystallization by a series of microscopic images. Based on the obtained parameters of recorded crystals, identification and temporary binding of structures in different time intervals are possible. The process of processing a series of microscopic images is considered, the main stages and the arising difficulties at each of them are revealed.

Introduction. Cryopreservation of biological material is one of the most promising areas of research in the field of bioengineering. Analysis of the freezing of biological material is primarily associated with a complex process of recrystallization [1]. Microscopy is one of the most commonly used methods for studying the process of recrystallization. Depending on the task, registration, and processing of microscopic images can be performed in various ways, for example, in several parallel planes with subsequent reconstruction [2-3], or in different time domains, with subsequent identification, the nature, and dynamics of the process being conducted. In fact, the analysis of a series of microscopic images is associated not only with the difficulties of structural segmentation an image but also with the big time-consumption by the computer in comparison with the human brain [4].

The development of software for the analysis of such a series of images should allow in the near future to identify the most appropriate freezing protocols to ensure long-term storage of living tissue.

Stages of processing and analysis of a series of cryomicroscopic images. A series of 1390 x 1038 px images are obtained from an Axio Imager M1m microscope (Carl Zeiss, Germany). That images used as initial data. The software (Fig. 1) was developed in the open Lazarus environment (license GNU GPL).

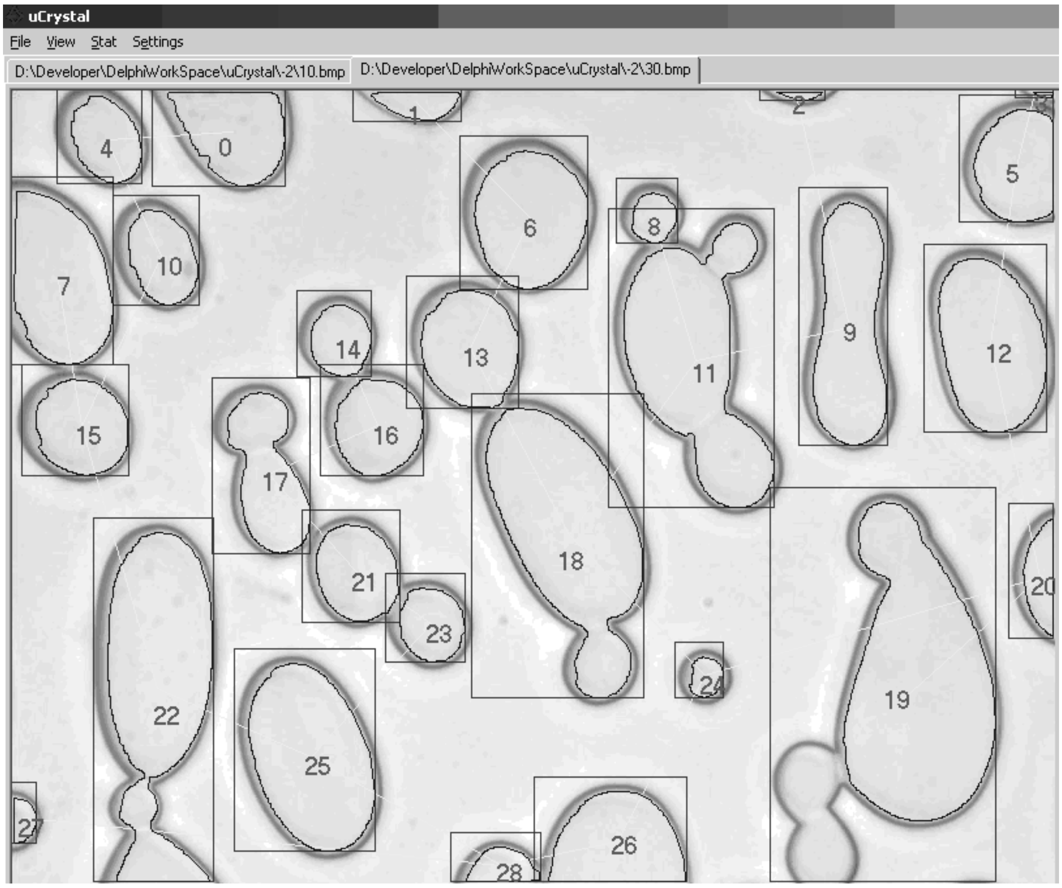

Figure 1 –The working window of the software for the analysis of the series microscopic images

The first is pre-processing of the original images. At the next stage, the segmentation of the pixels of the boundary of the analyzed crystals occurs. The resulting segmented areas are used to segment the crystal separately from the background. It should be taken into account that the impossibility of directly registering the pixels of a crystal is due to the fact that the intensity of the background pixels is approximately equal to the intensity of the pixels of the crystal. Then a sequence of morphological operations on the image is performed, this should remove the likely interference in the image.

One of the most difficult stages in the processing of a series of images is the segmentation of the pixels of the crystal, so there may be discontinuous contours in the image. On this basis, in many cases, the use of the fill operator, which can lead to the simultaneous selection of both the background pixels and the pixels of the crystal under investigation, is problematic. Therefore, the most effective is the use of the method of active contours.

After segmentation of crystals on all images, the parameters of the segmented objects are determined and then temporarily linked. Linking occurs by constructing a graph, followed by the calculation of the most likely matches. In addition, for visualization of the visualization of crystals, the subsequent three-dimensional pseudo-reconstruction is performed, which is based on the erosion of the profile of the object under study (Fig. 2).

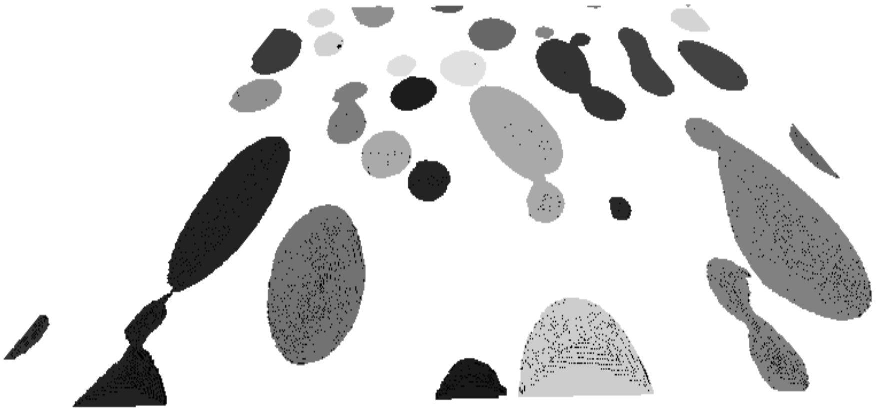

Figure 2 – Three-dimensional pseudo-reconstruction of crystals during thawing

Conclusions. Was developed software to determine the quantitative indicators of the crystallization process. Currently, the composite stages of image processing require control by the operator. This is due to the different parameters of the surveys and the samples under study and as a consequence, the emergence of difficulties in the automatic segmentation of crystals. The perspective of the work is to improve the speed by using GPGPU technology to speed up the processing of microscopic images.

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LONG DISTANCE WIRELESS POWERED IMPLANTABLE ELECTROSTIMULATOR

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Abstract. *A review of research progress on wireless powering of implantable stimulators is discussed and summarized. Decimeter size radio waves (midfield powering) as a very efficient method versus near-field inductively coupling power transfer. A prototype of miniature (20x12mm) implantable lower esophageal sphincter (LES) electrostimulator with long distance wireless charging was developed and tested. Wireless charging of prototype works at distances up to 3m at air and makes possible power transfer even to deep tissues.*

I. Introduction. Implantable electrostimulators were first introduced in medical practice in the early 60s of the 20th century, when a portable pacemaker with high reliability and durability was developed. Since then, the use of these devices in therapy and diagnosis of various diseases has been growing steadily. New application include gastric electrostimulation and direct modulation of the tone of the lower esophageal sphincter (LES) as effective non-medicine treatment of gastroesophageal reflux disease (GERD)1. Because of its relatively large size (about 55x60x10mm3), the pulse generators are usually implanted subcutaneously in the abdominal wall and connected to electrodes attached to stimulation area.

A common feature of active implants is lifetime limitations caused by capacity of the built-in battery, usually not more than 6-7 years 3.