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### Ultrasonic technologies in surgery

Prevalence of gunshot wounds in modern world is associated with criminalization of society, terrorist threats, increase of number of local military conflicts and civil unrest.

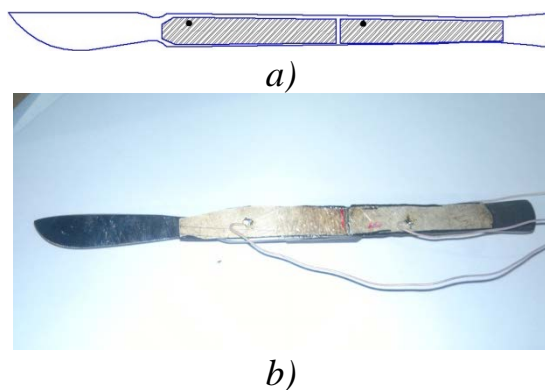
Search and development of methods for reducing blood loss, accelerating the healing of postoperative wounds and scars resorption is an important goal of modern surgery, which solution is facilitated by the use of ultrasound.

The use of ultrasonic surgery in military medicine and the use of piezoelectric elements as the source of ultrasound are perspective.

The aim of this project is to create theoretical foundations of designing of piezoelectric transducers for ultrasonic surgical instrument, used in military and civil medicine.

The new technology of the design of ultrasonic transducers for medicine and medical equipment and technology to increase the amplitude of the resonant vibration of cutting part of the surgical instrument were developed.

For experimental research a scalpel and disk piezoelectric element of  $\text{Ø}50 \times 1.2$  mm were used. Segments of the piezoelectric disk were attached to the scalpel with the help of epoxy resin. Research experimental sample is shown in Fig. 1.



*Fig. 1. Research experimental sample*

This work is made within the framework of the scientific project “Creation of a high-efficient intellectual complex for development and research of piezoelectric components for instrument making, medicine and robotics” which is carried out at the Department of computerized and informational technologies in instrument making.

Theoretical principles of combining and coordination of the components of ultrasonic surgical instrument of various physical natures (electromechanical, electrical and mechanical ones) will be created as a result of the project.