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APPLICATION OF AN ELECTRICAL DISCHARGE IN SALINE FOR REMOVAL OF BENIGN TUMORS

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Surgical instruments using plasma are widely used in various surgical procedures. The advantages of high-frequency plasma instruments are simultaneous hemostasis and dissection of tissues, and the ability to coagulate large vessels. A positive effect in this case is achieved by heat generation in the tissues. However, the temperature reaches 500 ° C and tissue is damaged to a depth of 5 mm [1]. The alternative method, which has recently begun to enter into medical practice is the removal of tissue using cold plasma. This method was developed by ArthroCare Co and named coblation [2].

Physical and chemical processes occurring in the plasma formed in a liquid are important for the understanding of the phenomena observed in surgical instruments. As the working fluid saline is used, which is prepared from sodium salt dissolved in water with a concentration of 0.9 g / l. The current passing through the electrolyte produces heat, which leads to the formation of a thin layer of bubbles, which covers the electrode. When an electrical discharge is created, gas in bubbles ionized.

Investigation of the device characteristics was conducted in saline solution. The output pulse of the device is biphasic with varying amplitude. The pulse repetition rate is $f = 25$ kHz. The current is measured via a shunt ($R_I = 1.5$ ohms). The voltage and current were recorded by a digital oscilloscope. The voltage was varied between 50 – 300 V. When voltage is applied, the current value is determined by the conductivity of the electrolyte. As electrolyte is heating, gas bubbles near the electrode are formed. As a result, the current value is determined by the characteristics of the discharge.

The device is developed for biological tissue removing. The tests show that the resistance of the gap between the electrodes in the electrolyte increases with the applied voltage. Upon reaching a voltage ~180 V, its resistance rises sharply due to the formation of gas bubbles. Then therein a discharge is developed and a plasma is formed.

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NICKEL ISOTOPE SEPARATION OCCURING FILLING OF GAS CENTRIFUGE CASCADE WITH DIFFERENT STAGE NUMBER

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