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INVESTIGATION OF LOW-PRESSURE HIGH-FREQUENCY JET DISCHARGE IN PLASMA-LIQUID TREATMENT PROCESSES ^{*)}²Abdullin I.Sh., ¹Akhatov M.F., ¹Gainullin I.I., ¹Gaisin A.F., ¹Kayumov R.R.¹*Kazan National Research Technical University named after A.N. Tupolev-KAI, kai@kai.ru*²*Plasma-VST LLC, Kazan, rushan_250189033@mail.ru*

High-frequency discharge with a jet of low-pressure liquid is one of the promising methods of plasma-liquid processing of materials. This method combines the advantages of high-frequency discharge and jet liquid supply, which allows you to create unique conditions for surface treatment of materials [1-3]. A high-frequency discharge is generated in a gaseous environment, creating a plasma - an ionized gas containing active particles such as ions, radicals, electrons and photons. A jet of liquid in a state of reduced pressure is fed into the discharge zone. This allows you to control the flow of active plasma particles and their interaction with the surface of the material. For the first time, studies were conducted with a high-frequency source in a liquid at low pressure in a wide range of parameters: jet diameter 1-3 mm, jet length from 5 mm to 90 mm, pressure 105- 103 Pa, a solution from 1% to 6% (NH₄)₂SO₄ in water was used as an electrolyte. An experimental installation has been developed and created, which consists of a high-frequency generator, a vacuum chamber, a pump, an upper electrolytic cell, height-adjustable, and a lower electrolytic cell. The electrolyte flows down to the lower electrolytic cell, forming a jet and a discharge burns at the interface of the electrolyte jet, various surface treatment materials are placed in the same area of the discharge combustion. Gorenje. In this paper, some forms of high-frequency discharge with a liquid jet at reduced pressure are considered. Materials such as M1 grade copper, St3 grade steel, Aisi 430, St20 were processed for the first time in the process of processing with a plasma-liquid system. This method is more environmentally friendly than some traditional methods of material processing, as it does not require the use of aggressive chemicals. Minimal thermal distortion minimizes the thermal impact on the metal being processed, which allows thin materials to be processed without distortion. The electrolyte jet allows you to process complex shaped parts. The use of a high-frequency jet discharge of a low-pressure discharge makes it possible to clean, polish surfaces, modify the surfaces of materials such as roughness, strength, etc. High-frequency discharge with a low-pressure liquid jet is a promising method of plasma-liquid processing of materials, offering a number of advantages. It will find wide application in various industries where modification of the surface of materials is required to achieve the required properties, such as automotive, aviation, medicine, electronics.

References

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