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STUDY OF CHARACTERISTICS OF HIGH FREQUENCY PLASMA GENERATOR OF STATIONARY NEGATIVE ION SOURCE FOR ACCELERATOR NEUTRON SOURCE *)

Gmyrya A.A., Belchenko Yu.I., Bulatova U.D., Gavrisenko D.Yu., Sanin A.L., Sotnikov O.Z.

Institute of Nuclear Physics named after G.I. Budker SB RAS, Novosibirsk, Russia,
A.A.Gmyrya@inp.nsk.su

An accelerator neutron source for boron neutron capture therapy has been created at the Institute of Nuclear Physics SB RAS (Novosibirsk), in which neutrons are formed due to the interaction of accelerated protons with a lithium target, and the protons themselves are obtained due to the acceleration and stripping of a beam of negative ions in tandem with vacuum insulation (VITA) [1]. Currently, the institute is assembling a neutron source, which will be installed in the clinic of the N. Blokhin Oncology Center. When installing the equipment in the clinic, additional requirements are imposed on the increased reliability, trouble-free operation and ease of maintenance. For an accelerator neutron source, it is important to ensure long-term operation of a stationary high current (with a current of about 10 mA) source of negative ions (SNI). Thus, in existing arc-discharge SNI, the bottleneck is the rapid wear of the pins of the heated cathodes [2], whereas in Penning IONS with a hydrogen-cesium discharge, it is important to prevent the formation of cesium plugs in the cesium supply channels [1]. Stationary SNI with high-frequency plasma generators, developed at the INP for the CTS injectors, demonstrate greater reliability and ease of maintenance [3]. This paper describes the work on the creation of a new stationary source of negative ions with a high-frequency plasma generator for clinical use. The design of the source and the results of a study of its characteristics are described: probe measurements of plasma and thermal modes of the main components of the RF driver at different RF power and hydrogen pressure.

References

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