

Lithium target VITA

Evgeniia Sokolova^{1,2}, Marina Bikchurina^{1,2}, Timofey Bykov^{1,2}, Dmitrii Kasatov^{1,2}, Yaroslav Kolesnikov^{1,2}, Aleksandr Makarov¹, Georgy Ostreinov^{1,2}, Sergey Savinov^{1,2}, Sergey Taskaev^{1,2}

¹ Budker Institute of Nuclear Physics, Novosibirsk, Russia

² Novosibirsk State University, Novosibirsk, Russia

E-mail: buiya@bk.ru

With the current development of AB-BNCT, one of the most important tasks is to create a neutron generating target that provides a neutron beam with the parameters recommended by the IAEA [1] and is suitable to be used in clinics. There are several neutron-producing reactions of interest for AB-BNCT, but $^7\text{Li}(\text{p},\text{n})^7\text{Be}$ is considered preferable [2]. The lithium target was developed at the Budker Institute of Nuclear Physics (Novosibirsk, Russia) [3] and now it is used for neutron generation at the accelerator based neutron source VITA [4] in Novosibirsk, Moscow (N.N. Blokhin National Medical Research Center of Oncology) and in China (Xiamen Humanity Hospital BNCT Center).

The work describes the principle of the lithium target VITA, the process of manufacturing, storage and delivery, and the parameters validation. To confirm the parameters of the neutron beam, the total yield of neutrons and gamma quanta from the lithium target VITA were measured. To assure the quality of the target, its thickness and purity were measured under various neutron generation and storage conditions. For this purpose the method for *in situ* measuring the thickness of lithium based on the gamma quanta yield has been developed. The purity of the target was determined by measuring the backscattered protons while proton irradiation of the target. When assuring the quality of the target it was exposed to the prolonged proton irradiation to find out the blistering effect, to the high power density of the proton beam, and to the various vacuum conditions.

The lithium target VITA provides the neutron beam parameters recommended by the IAEA, is suitable for use in clinics, generates neutron without decrease of the neutron yield for more than 227 hours with the 300 W/cm^2 power density of the proton beam.

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