APPLICATION OF THE ACCELERAtor-based NEUTRON SOURCE vita FOR INVESTIGATION OF PROMISING MATERIALS AND NUCLEAR REACTIONS [[1]](#footnote-1)\*)

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The neutron source VITA, consisting of an original design tandem accelerator (vacuum insulated tandem accelerator), thin lithium target, and a neutron beam shaping assembly, was designed and created at the Budker Institute of Nuclear Physics, Novosibirsk, Russia. The facility produces powerful neutron fluxes in a wide range of energies: from cold to fast.

Basically, the facility is used to develop boron neutron capture therapy (BNCT) [1]. This neutron source is considered as one of the most suitable sources of neutrons for oncological clinics. The BNCT center in Xiamen (China), equipped with such a neutron source, started treating patients using this technology since 2022. Similar facilities are under construction for the National Oncological Hadron Therapy Center in Pavia, Italy, and for the National Medical Research Center of Oncology in Moscow, Russia.

The facility was used to study radiation blistering of metals during ion implantation [2, 3], for radiation testing of boron carbide ceramics and steel for ITER [4-6], to study the dependence of optical fiber transparency on the fast neutron fluence up to the value of 3 1014 cm-2, for cross-section measurement for the 7Li(p,α)α reaction [7], etc. Current research at the facility is focusing on measuring the 11B(p,) reaction cross section for neutronless fusion energy and developing a compact fast neutron source for fast neutron therapy and radiation testing of materials.

The report will describe the neutron source VITA, present and discuss the results obtained, and declare plans.

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References

1. Taskaev S., *et al.* Biology, 2021, v. 10, 350.
2. Badrutdinov A., *et al*. Metals, 2017, v. 7, 558.
3. Bykov T., *et al*. NIM B, 2020, v. 481, p. 62-81.
4. Shoshin A., *et al*. IEEE Transactions on Plasma Science, 2020, v. 48, p. 1474-1478.
5. Shoshin A., *et al*. Fusion Engineering and Design, 2021, v. 168, 112426.
6. Shoshin A., *et al*. Fusion Engineering and Design, 2022, v. 78, 113114.
7. Taskaev S., *et al*. NIM B, 2022, v. 525, p. 55-61.

1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/L/E/ru/KD-Taskaev.docx) [↑](#footnote-ref-1)