TASKAEV-1: Recent advances in the development of an accelerator based neutron source for BNCT

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An accelerator based epithermal neutron source was proposed and created at the BINP for the development of boron neutron capture therapy [1]. This source is a state-of-the-art device comprised of the Vacuum Insulation Tandem Accelerator (VITA) - a new type of charged particle accelerator, an advanced solid lithium target, and a neutron Beam Shaping Assembly. Over the past couple of years, significant progress has been made in its development and the scope of its applications has been expanded, namely: i) the proton beam current increased to 9 мА; ii) the high-voltage breakdowns on the surface of the feedthrough insulator are completely excluded [2]; iii) blistering studied [3, 4] and a target with superior resistance to blistering is made; iv) a small-sized neutron detector that measures the boron dose has been developed [5]; v) a ^{7}Li(p,p'γ)^{7}Li reaction cross-section and 478 keV photon yield from a thick lithium target are measured at proton energies from 0.7 to 1.85 MeV [6]; vi) boron imaging using neutrons exclusively in the epithermal energy range is proposed and realized partially [7]; vii) a new technique is proposed for *in situ* measuring of lithium thickness [8]; viii) development of the BNCT technique in cell cultures and laboratory animals continues [9]; ix) concentration of hazardous impurities was measured in the samples of boron carbide for ITER [10]; x) a powerful flux of fast neutrons was generated for the possible radiation testing of the fibers for CERN [11], xi) the BINP source became a prototype of the source manufactured by TAE Life Sciences (USA) for the clinic in Xiamen (China) - one of the first five BNCT clinics. The report gives the construction of the source, presents the results of the research and declares the plans.

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