other

Application of α-spectrometry at the accelerator based neutron source VITA

Marina Bikchurina, Tymofey Bykov, Dmitrii Kasatov, Iaroslav Kolesnikov, Georgii Ostreinov, Sergey Savinov, Anna Shuklina, Evgeniia Sokolova and Sergey Taskaev

Budker Institute of Nuclear Physics, Novosibirsk, Russia
Novosibirsk State University, Novosibirsk, Russia

The tandem electrostatic charged particle accelerator of the unique design, named the Vacuum Insulated Tandem Accelerator (VITA), was proposed, created, and now is in operation at Budker Institute of Nuclear Physics. The accelerator generate stable direct current proton or deuteron beams with the energy up to 2.3 MeV and the current up to 10 mA. It is equipped with γ-, α-, and neutron spectrometers and dosimeters. The accelerator is used for the development of boron neutron capture therapy of malignant tumors, radiation testing of promising materials, and more recently for measuring cross-sections of nuclear reactions.

α-spectrometry at the accelerator based neutron source VITA has been successfully applied in testing various materials under a proton beam, providing knowledge of the composition of the sample under investigation and providing control of the sample surface atomization during irradiation. The method has been successfully applied to determine the thickness of a number of thin films. More recently, α-spectrometry has been successfully applied to the measurement of a number of cross sections of nuclear reactions of proton and deuteron with lithium and boron. This paper will present an overview of the practical application of the α-spectrometer at the VITA facility for various purposes.

Acknowledgments:
This work was supported by the Russian Science Foundation (grant number 19-72-30005).