MASS SEPARATION OF Ag+Pb MIXTURE IN CROSSED EB FIELDS IN COLLISIONLess MODE [[1]](#footnote-1)\*)

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Currently, the PUREX chemical extraction process is used to reprocess spent nuclear fuel (SNF). Despite the industrial application of the method, a large amount of liquid radioactive waste is generated during processing. This creates an additional burden on the environment. Therefore, the search for new technologies for reprocessing spent nuclear fuel with a smaller amount and activity of radioactive waste does not stop.

One of these technologies is plasma mass separation [1,2]. The concept of plasma separation is based on the idea of sequential processes: 1. Evaporation and ionization of SNF. 2. Spatial separation of the SNF plasma flow into two mass groups (actinides and uranium decay products) in crossed electric and magnetic fields in the presence of a background plasma. The task of the background plasma is to compensate for the space charge of the separated beams to increase the throughput in comparison with electromagnetic methods. 3 Deposition of separated SNF flowa onto a substrate.

The paper presents studies of the separation process at the LaPlaS setup [3]. A mixture of silver and lead is used to simulate SNF in experiments. The vacuum chamber has a diameter of 86 cm and a length of 220 cm. A reflex discharge with a hot cathode (background plasma) is ignited in a longitudinal magnetic field. In this plasma, a radial electric field is formed. A plasma jet of the Ag + Pb mixture is injected onto the periphery of the plasma column of the background plasma by a independent plasma source [4]. The electric field of the background discharge entrains silver and lead ions in a direction transverse to the magnetic field. The components of the mixture separated in space are deposited on the substrate. The substrate samples are analyzed by energy dispersive X-ray spectroscopy.

References

1. Dolgolenko D A and Muromkin Y A Physics-Uspekhi 2017, 60, 994.
2. Zweben S J, Gueroult R and Fisch N J Phys. Plasmas 2018, 25, 90901.
3. N. Antonov, G. Liziakin, R. Usmanov, A. Gavrikov, N. Vorona, and V. Smirnov, Phys. Plasmas 2018, 25, 123506.
4. N. N. Antonov, A. V. Gavrikov, V. P. Smirnov, G. D. Liziakin, R. A. Usmanov, N. A. Vorona, and R. A. Timirkhanov, J. Phys. Conf. Ser. 2018, 946, 012171.

1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVIII/Lt/ru/EF-Lizyakin.docx) [↑](#footnote-ref-1)