PRODUCTION OF RADON ISOTOPES IN THE REACTION ^{40}Ar + ^{232}Th AT MASS SEPARATOR MASHA

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Nuclei near the neutron $N = 126$ and $N = 152$ shell closures are of great interest, since this region of nuclei is not enough investigated so far and in addition its research has direct relation to the synthesis of superheavy elements. As it is known the island of stability close to superheavy elements ($Z = 112$–118) exists due to shell effects in the nucleus. The more detailed investigation of these shell effects can greatly help in the synthesis of the next superheavy elements.

The experiment was carried out on upgraded mass separator "MASHA" including the modernization of rotating target node, hot catcher, ECR-ion source, beam diagnostics and DAQ system at the Flerov Laboratory of Nuclear Reactions (JINR, Dubna). The beam of ^{40}Ar ions from U400-M cyclotron were used with energy E = 282 MeV. The composite target ^{232}Th was used in the experiment: An alcohol solution of thorium nitrate was deposited into flexible graphite (thickness = 0.3 mm) and annealed at the temperature 1900°C.

Production yields of radon isotopes were measured in the multinucleon transfer reaction ^{40}Ar + ^{232}Th. The isotopes with given masses were detected using two detectors: a multi-strip detector of the well-type (made in CANBERRA) and a position-sensitive quantum counting hybrid pixel detector of the TIMEPIX type. The isotopes implanted into the detectors then emit alpha- and beta-particles until reaching the long lived isotopes. The position of the isotopes, the tracks, the time and energy of beta- particles were measured and analyzed. A new software for the particle recognition and data analysis of experimental results was developed and used. The software uses the neural network approach. It was shown that MASHA + TIMEPIX setup is a powerful instrument for investigation of neutron-rich isotopes far from stability limits.