

Experimental study of the $^{243}\text{Am} + ^{48}\text{Ca}$ reaction at the new separator DGFRS-2

We present results of the first experiments aimed at the synthesis of Mc isotopes in the $^{243}\text{Am} + ^{48}\text{Ca}$ reaction performed at the new gas-filled separator DGFRS-2 on-line to the new cyclotron DC280 at the SHE Factory at JINR. In the first experiment performed at three ^{48}Ca energies of 239, 241, and 244 MeV, we observed fifty five new decay chains of ^{288}Mc and six chains assigned to ^{289}Mc which decay properties are mostly consistent with those measured in previous studies. The α decay of ^{268}Db with an energy of 7.6-8.0 MeV, half-life of 16^{+6}_{-4} h, and a branch of $55^{+20}_{-15}\%$ was registered for the first time, and a new spontaneously fissioning isotope ^{264}Lr with a half-life of $4.9^{+2.1}_{-1.3}$ h was identified. The measured cross section of $17.1^{+6.3}_{-4.7}$ pb for the $^{243}\text{Am}(^{48}\text{Ca},3n)^{288}\text{Mc}$ reaction was approximately twice the value measured in the previous experiments.

In the second experiment, the new isotope ^{286}Mc with half-life of 20^{+98}_{-9} ms and α -particle energy of 10.71 ± 0.02 MeV was synthesized. The spontaneous fission of ^{279}Rg was observed for the first time in one of the four new decay chains of ^{287}Mc . Excitation function of the reaction was measured at three ^{48}Ca energies of 242, 250, and 259 MeV which resulted in the first observation of the 5n-evaporation channel of $0.5^{+1.3}_{-0.4}$ pb.

The transmission of the new separator DGFRS-2 was found to be about two times larger than that of DGFRS, which makes it a promising experimental facility for continuing research of superheavy nuclei.

Section

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