

CONFIRMATION OF THE DECAY OF $^{283}112$ AND EVIDENCE FOR Hg-LIKE BEHAVIOR OF ELEMENT 112

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An ongoing bombardment of a 1.4 mg/cm² thick ^{242}Pu target with approx. 300 pA of 243 MeV ^{48}Ca (at the entrance to the target) at the U-400 cyclotron of the Flerov Laboratory for Nuclear Reactions aims at the production of $^{283}112$. The experiment is designed to investigation chemical properties of element 112 and to confirm the decay properties of the 4s $^{283}112$ reported in [1]. In this reaction the isotope $^{287}114$ is formed in the 3n evaporation channel which decays with $T_{1/2} \approx 0.5$ s to $^{283}112$. Products recoiling from the target are thermalized in a He/Ar gas volume, where $^{287}114$ decayed to $^{283}112$ which is then transported to the Cryo On-Line Detector (COLD) [2]. This detection device represents a rectangular chromatography channel formed by 32 PIPS detector pairs, each pair kept at a different temperature between -20°C and -184°C, respectively. One side of the detector pairs is covered by a thin Au layer. The experiment aims at the determination of the deposition temperature of element 112. The established temperature range enables to distinguish between a Hg-like behaviour (first detectors) and a Rn-like behaviour (last detectors).

During 10 days beam time one decay chain was observed in detector two. A 9.45 MeV α -decay was followed 600 ms later by a SF coincidence of high total kinetic energy.

This decay pattern was unique, with an exceptionally low probability to be random, thus confirming the reported decay properties of $^{283}112$ produced in the reaction $^{48}\text{Ca} + ^{242}\text{Pu}$ [1].

The observed deposition behavior points to properties of element 112 being more like Hg rather than similar to Rn.

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References

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- [2] Eichler, R., Bröchle, W., Buda, R. et al.: *Radiochimica Acta*, vol. 94, p. 181-191, 2006.