УДК [539.172.17+539.143] (063)
ББК 22.383.5я431
I69

Co-Chairmen:

Yu. Oganessian	*JINR, Dubna*
S. Hofmann	*GSI, Darmstadt*
T. Motobayashi	*RIKEN, Wako*
S. Gales	*GANIL, Caen*

Local Organizing Committee:

Yu. Penionzhkevich	*Vice-chairman*
E. Cherepanov	*Scientific secretary*
D. Kamanin	
E. Kuznetsova	
A. Mezentsev	
V. Migunov	
Yu. Reutov	
Yu. Sereda	
Yu. Sobolev	

Supported by
Russian Foundation for Basic Research, No. 06-02-26102-г

Layout of the manuscript by *Evgeni Cherepanov*

The contributions are reproduced directly from the originals presented by the Organizing Committee.

International Symposium on Exotic Nuclei (EXON-2006) (Khanty-Mansiysk, Russia, 17–22 July 2006): Abstracts. — Dubna: JINR, 2006. — 85 p.
I69 ISBN 5-9530-0119-3

Международный симпозиум по экзотическим ядрам (EXON-2006) (Ханты-Мансийск, Россия, 17–22 июля 2006 г.): Тез. докл. — Дубна: ОИЯИ, 2006. — 85 с.
ISBN 5-9530-0119-3

УДК [539.172.17+539.143] (063)
ББК 22.383.5я431

ISBN 5-9530-0119-3

CHEMICAL IDENTIFICATION OF THE ELEMENT 112 IN THE REACTION $^{48}Ca+^{242}Pu$

Dmitriev, S.N.[1], *Eichler, R.*[2,3], *Aksenov, N.V.*[1], *Belozerov, A.V.*[1], *Bozhikov, G.A.*[1], *Chepigin, V.I.*[1], *Dressler, R.*[2], *Gäggeler, H.G.*[2,3], *Gorshkov, V.A.*[1], *Haenssler, F.*[3], *Itkis M.G.*[1], *Lebedev, V.Ya.*[1], *Laube A.*[2], *Malyshev, O.N.*[1], *Oganessian, Yu.Ts.*[1], *Popeko, A.G.*[1], *Petruschkin, O.V.*[1], *Piguet, D.*[2], *Rasmussen, P.*[2], *Shishkin, S.V.*[1], *Shutov, A.V.*[1], *Svirikhin, A.I.*[1], *Tereshatov, E.E.*[1], *Vostokin, G.K.*[1], *Wegrzecki, M.*[4] & *Yeremin, A.V.*[1]

[1] Flerov Laboratory for Nuclear Reactions,JINR, 141980 Dubna, Russia.
[2] Paul Scherrer Institute, CH-5232 Villigen, Switzerland.
[3] Department for Chemistry and Biochemistry, University of Bern, CH-3012 Bern, Switzerland.
[4] Insitute of Electron Technology, 02-668 Warsaw, Poland.

The isotopes of the new elements 112-116 and 118 at most undergo α-decays (one or several) that finally end up in spontaneous fission (SF) .[1]. Their identification is based on their radioactive decay properties and the reaction mechanism. At the same time, chemical identification of isotopes in the observed decay chains could give us the identity of the atomic numbers of nuclei in the decay chain and provide independent evidence for the discovery of a new element (elements). The first such an experiment was successfully carried out for element 115 [2].

The present experiment is designed to confirm the decay properties of the 4s $^{283}112$ reported in [1] and to investigation of chemical properties of element 112. The reaction of ^{48}Ca with ^{242}Pu was investigated at the U-400 cyclotron of Flerov Laboratory. 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) [3]. This detection device represents a rectangular chromatography channel formed by 32 detector pairs, each pair kept at a different temperature between +35°C(#1) and -180°C(#32), 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 on the gold layers. The established temperature range enables to distinguish between a Hg-like behaviour (first detectors) and a Rn-like behaviour (last detectors).

During 3 weeks beam time two decay chains were observed. In the first chain a ≈ 9.50 MeV α-decay was followed 592 ms later by a SF coincidence of TKE ≈230 MeV, in the second chain a ≈ 9.50 MeV α-decay was followed 536 ms later by a SF coincidence of TKE ≈230 MeV. Their decay patterns are unambiguously consistent with decay properties reported earlier [1]. The observed deposition behaviour points to properties of element 112 being more like Hg rather than similar to Rn.

This experiment independently confirmed the synthesis of new super heavy elements with atomic number 114 and 116 also.

This work was supported by the Russian Foundation for Basic Research (grants nos. 04-03-32047) and the National Scientific Foundation of Switzerland.

References

1.Yu.Ts. Oganessian et al., Phys. Rev., 2004, C 69, 054607.

2.S.N. Dmitriev et al., Mendeleev Commun. 1 (2005), 1

3. R.Eichler et al ,Radiochim. Acta,181 (2006).