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At the End of the Periodic Table

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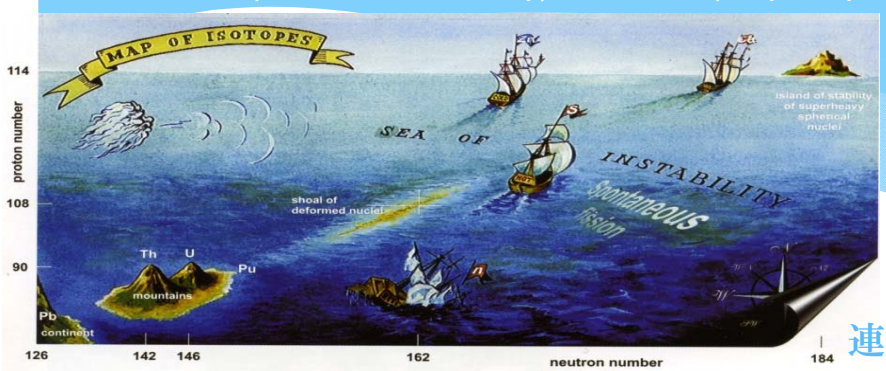
One of the fundamental outcomes of the nuclear shell model is the prediction of the "stability islands" in the domain of the hypothetical superheavy elements. The enhanced stability has been expected for the deformed nuclei near Z=108 and N=162, yet much stronger effect has been predicted for heavier spherical nuclei close to the shells Z=114 and N=184, next to the doubly-magic nucleus ^{208}Pb (Z=82, N=126). The talk is devoted to the experimental verification of these predictions – the synthesis and study of both the decay and chemical properties of the superheavy elements. The synthesis of the heaviest and neutron-rich nuclei has been carried out in the fusion reactions of ^{233,238}U, ^{237}Np, ^{242,244}Pu, ^{245,248}Cm, ^{249}Bk and ^{249}Cf with the ^{48}Ca projectiles, that made it possible to observe the decay of the 48 new neutron-rich nuclides with Z=104-118 and N=161-177. The decay properties of the new isotopes present direct experimental evidence of the existence of the Island of stability in the region very heavy (superheavy) nuclei that considerably expand the Periodical Table of the chemical elements. Simultaneously, in the chemical studies of elements 112 by methods of absorption gas chromatography the influence of the "relativistic effect" on the chemical properties of the superheavy elements was revealed for the first time. In the talk are used the results obtained in FLNR (Dubna, Russia) in collaboration with LLNL, (Livermore, USA), ORNL (Oak-Ridge, USA), PSI (Villigen, Switzerland) and Vanderbilt University (Nashville, USA) as well as in GSI (Darmstadt, Germany) and RIKEN (Tokyo, Japan).



連絡員　有友嘉浩（内線　2955）