SUPERHEAVY ELEMENTS OF THE MENDELEEV's PERIODIC TABLE. PRESENT STATUS AND FUTURE

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The synthesis of superheavy elements (SHE) with atomic numbers 113-118 has been achieved and consequently the seventh period of the D.I. Mendeleev's Periodic Table has been completed. Unique data on the nuclear-physical properties of isotopes of the new elements have been obtained (Ref.1). Pioneering experiments on the chemical properties of elements 112 (Cn), 113(Nh) and 114(Fl) (Ref.2) have been carried out. The discovery of a new region (island) of stability of SHE has brought up a whole new series of questions related to the fundamental properties of nuclear matter: can there exist even heavier nuclei? Is this newly discovered "island of stability of SHE" the last one on the map of nuclides ? where lie the boundaries of the Periodic Table of D.I. Mendeleev, to what extend the chemical properties of SHE resemble those of their lighter homologues ?

The pursuit of the next level of these investigations will only be possible through the creation of a new experimental framework capable of delivering significant increases in the efficiency of the experiments. As a response to this complex challenge, a new project has been launched at FLNR/JINR – the creation of the first in the world Superheavy Elements Factory (Ref.3), comprising: the construction of a new, powerful accelerator of stable and long-lived radioactive isotopes with masses in the range of A = 10-100, intensities up to 10 pμA and energies up to 8 MeV/n; and the development of new target materials, new separators and new detection modules for the study of the nuclear, atomic and chemical properties of the new elements. It is possible to increase the production rate of the known isotopes of SHE by one to two orders of magnitude and carry out experiments aimed at the synthesis of new elements with Z>118 by employing a new experimental complex "SHE Factory" and thus make a second breakthrough in the world of the heaviest elements.

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