

**THE THEORY AND REALIZATION OF SUPERHEAVY NUCLEI SYNTHESIS
IN THE PROCESS OF CONTROLLED ELECTRON-NUCLEAR COLLAPSE OF
CONDENSED TARGET**

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The problem of stability of condensed target in particular and stability of "usual" atomic form of matter in general in relation to the process of self-squeezing up to the collapse state and full-range laboratory nucleosynthesis is studied.

It was shown for the first time that for a neutral atom compressed by external forces, a threshold electron density is shown to exist [1]. If such a density is reached, a self-organizing process of "electron downfall to the nucleus" starts. This process is exoenergetic and leads to the formation of a supercompressed electron-nuclear cluster. The higher the charge of a nucleus, the lower the threshold of the external compression. The method of realization of such requirement was studied.

It is shown that the maximum binding energy shifts during such a self-organizing collapse of the electron-nuclear system from $A_{\text{opt}} \approx 60$ (for uncompressed substance) to the area of high mass numbers $A_{\text{opt}} \geq 200 \dots 5000$ and could render the synthesis of superheavy nuclei to be energy efficient [1]. The synthesis proceeds through the absorption of other nuclei by the collapsed nucleus. It is theoretically proved that the synthesis efficiency is ensured by both the width reduction and increased transparency of the Coulomb barrier in the extremely compressed electron-nuclear system. The release of binding energy through the absorption of nuclei by the electron-nuclear collapsed clusters may result in the simultaneous emission of lighter nuclei.

Such mechanism take place in any nuclei in the collapse area. The mechanism of formation and evolution of an annular self-controlled electron-nucleus collapse up to state of nuclear substance at the center of condensed targets is also discussed [2].

It is assumed that such mechanism of synthesis can explains the formation of electron-nuclear collapse, the creation of stable superheavy and other anomalous nuclei (about 10^{14} - 10^{15} superheavy stable nuclei were created in each of the performed experiments) in the collapse zone observed in about 10000 experiments with electron driver carried out at the Kiev Electrodynamics Laboratory "Proton-21" during 2000-2005.

[1]. Adamenko S. V., Vysotskii V.I. Mechanism of synthesis of superheavy nuclei via the process of controlled electron-nuclear collapse // Foundations of Physics Letters, v. 17, No. 3, 203-233 (2004).

[2]. Adamenko S. V., Vysotskii V.I. Evolution of annular self-controlled electron-nucleus collapse in condensed targets //Foundations of Physics, v. 34, No. 11, 1801-1831 (2004).