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**ENCAPSULATING OF HIGH-LEVEL RADIOACTIVE WASTE WITH USE OF
PYROCARBON AND SILICON CARBIDE COATINGS****A. Chernikov**

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It is known that high-level radioactive waste (HLW) constitute a real danger to biosphere, especially that their part, which contains transuranium and long-lived radionuclides resulting during reprocessing of nuclear fuel industrial and power reactors. Such waste contains approximately 99 % of long-lived fission products and transplutonium elements. At present, the concept of multibarrier protection of biosphere from radioactive waste is generally acknowledged. The main barriers are the physicochemical form of waste and enclosing strata of geological formation at places of waste-disposal. Applied methods of solidification of HLW with preparation of phosphatic and borosilicate glasses do not guarantee in full measure safety of places of waste-disposal of solidified waste in geological formations during thousand years. One promising way to improve HLW handling safety is placing of radionuclides in mineral-like matrixes similar to natural materials. The other possible way to increase safety of HLW disposal places is suggested for research by experts of Russian research institutes, for example, in the proposal for the Project of ISTC and considered in the present report, is to introduce an additional barrier on a radionuclides migration path by coating of HLW particles. Unique protective properties of pyrocarbon and silicon carbide such as low coefficients of diffusion of gaseous and solid fission products and high chemical and radiation stability [1] attract attention to these materials for coating of solidified HLW. The objective of the Project is the development of method of HLW encapsulating with use of pyrocarbon and silicon carbide coatings. To gain this end main direction of researches, including analysis of various encapsulation processes of fractionated HLW, and expected results are presented. Realization of the Project will allow to prove experimentally the efficiency of the proposed approach in the solution of the problem of HLW conditioning and ecological safety of waste-disposal in geological formations.

References

- (1) R.J. Price. Properties of silicon carbide for nuclear fuel particle coatings.
- (2) E. Groos, G. Mielken et al. Fission product release from coated particles embedded in spherical fuel elements for high-temperature reactors. - J. Nucl. Technology, 1977, vol. 35, No. 2, pp. 320 – 326; pp. 509-515.