

STUDY OF THE INFLUENCE OF INITIAL PARAMETERS OF THE CHARGE ON PHASE FORMATION NICELLANEIOUS MATRIX OBTAINED IN THE TECHNOLOGICAL MODE OF BURNING

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There is about 560 million cubic meters of radioactive waste accumulated within the territory of Russian Federation; moreover, 50 % of it is located in temporary storages before further reprocessing. Besides that, 5 million cubic meters of radioactive waste is originated every year. [1]

SHS-based materials synthesis included the following steps:

- mixing powders of initial reagents according to the stoichiometric calculation for the corresponding reaction equations;
- drying the initial mixture of reactants in a technical vacuum;
- mixing in a cubic mixer; - compressing the initial reactants mixture into cylindrical pellets of different diameter and height with variations in material density values in samples obtained by changing the pressure;
- running the SHS process in a laboratory facility and obtaining functional materials samples [2].

To obtain the result, which is the most appropriate to the characteristics, the samples with various contents of Ni (15 ... 45 wt.%) and compaction pressure (20 ... 30 MPa) were prepared.

Phase formation of the samples, synthesized through variation of nickel percentage and compaction pressure, is listed in the table 1.

Table 1. Phase formation of the samples according to nickel percentage variation

№	Phase percentage, %					P, MPa	Nickel additive percentage, %
	Ni ₂ Al ₃	NiAl ₃	Nd ₂ O ₃	NdAlO ₃	Al		
1	14,4	15,6	32,4	7,9	29,7	20	10
2	16,8	22,4	25,8	8,4	26,6	25	
3	25,3	23,7	17,9	10,3	22,8	30	
4	18,4	20,4	25,1	10,3	25,8	15	15
5	18,2	19,3	26,7	11,2	24,6	20	
6	18,3	21,3	24	12,3	24,1	25	
7	17,2	21,1	24,9	14,5	22,3	30	
8	19,0	30,9	20,1	18,4	11,6	15	20
9	21,1	25,3	26,5	19,9	7,2	20	
10	22,0	24,7	30,1	22,5	0,7	25	
11	19,7	20,6	33,8	25,9		30	
12	35,9	30,6	2,3	31,2		15	25
13	35,7	23,6	1,8	38,9		20	
14	35,8	18,7	1,2	44,3		25	

It is established that the samples obtained by compression of the mixture with the addition of Ni samples at the compaction pressure increased from 15 to 30 MPa experience the phase shift towards the final product formation due to the higher energy yield.

The maximum amount of aluminum perovskite is observed when the initial mixture compaction pressure equal to 30 MPa and 25% wt. nickel.

References

1. Skachek M.A. Spent nuclear fuel and radioactive waste management of NPP. – Moscow: Publ. MEI, 2007, p. 488.
2. Itin V.I. High temperature synthesis of intermetallic compounds. – Tomsk: Publ. TSU, 1989, 214 p.

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