

**BERYLLIUM-STEAM INTERACTION EXPERIMENTS. DETERMINATION OF OXIDIZED BERYLLIUM EMISSIVITY**

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ЭКСПЕРИМЕНТЫ ПО ИЗУЧЕНИЮ ВЗАИМОДЕЙСТВИЯ БЕРИЛЛИЯ С ПАРОМ. ОПРЕДЕЛЕНИЕ СТЕПЕНИ ЧЕРНОТЫ ОКИСЛЕННОГО БЕРИЛЛИЯ

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This report includes results of measuring beryllium emissivity factor in wide temperature range.

Experiments were made at IAE NNC RK in order to obtain experimental data meant for verification of calculation codes describing accident situation involving water coolant release into vacuum cavity of ITER reactor.

Samples of beryllium were made at beryllium plant of Stock Public Company "UMZ". In experimental samples we use beryllium DB-56 with pure 98.79%.

To conduct experiments there have been developed and manufactured facility to study vapor/metal interaction (FISMI).

The facility consists of a vacuum chamber meant to locate the models studied and the following systems providing with experimental conduction:

- 1) Vacuuming system;
- 2) System of water vapor preparation and supply in to the chamber (PSS);
- 3) Parameter measurement and registration system (MRS).

Conditions of the experiments are the following:

Medium in the chamber..... water vapor;
 Pressure in the chamber.....not more than 30 torr;
 Chamber wall temperature.....about 470 K;
 Initial temperature of beryllium surface670...1370 K;
 Pressure of water vapor in the chamber.....0.1...0.2 MPa;
 Water vapor temperature about 470⁰ K;
 Steam supply about 40 s.

Experiments on oxidation of beryllium samples within the temperature of up to 1100K and under non-steady conditions of the water steam pressure were conducted. Emissivity factor of the samples of beryllium oxide and beryllium (oxidized and non-oxidized) with different configuration was measured.

Influence of the surface geometrical parameters on the average emissivity factor of non-oxidized beryllium (with a hole and holeless) was studied. The average emissivity factor of the polished samples with a hole, which occupy 4% of the observed region, is almost twice as much as that of the holeless sample.

There were no observed changes of the emissivity factor of beryllium samples under a short-term holding (10min.), when the temperature was about 1280 K and the air pressure – 13 Torr.

A self-sustaining reaction of beryllium with water steam was not observed under the studied range of parameters.

There was a discovered sensible agreement of emissivity factor-temperature ratios of the samples with a central hole, that were oxidized in water steam environment under different pressure and equal temperature values.

The outcomes, obtained from the experiments conducted under different conditions, have various quantitative values. But, depending on the basic determinative values, they obey to common laws. When the partial pressure of water steam in the vacuum chamber increases, beryllium samples are oxidized more intensively. However, a tendency to emissivity factor variations remains the same, not depending on a water steam concentration value.