METHOD FOR OBTAINING SAMPLES FOR MEASURING THE DISTRIBUTION OF NUCLEAR FUEL AND ITS FISSION PRODUCTS IN HTR FUEL PARTICLES

A. N. Gludkov, V. A. Kashparov, V. M. Kolobashkin,*
A. A. Kotlyarov, A. D. Kurepin,
N. N. Ponomarev-Stepnoi, and A. A. Khrulev

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To optimize the construction and technology for fabrication of HTR fuel particles it is necessary to have experimental information both on the starting technological contamination of the protective coatings of the fuel particles with the fissioning material and on the distribution of the nuclear fuel and fission products in samples subjected to reactor tests. The difficulties in performing such studies are caused by the following: the smaller sizes of the fuel particles (the diameter is less than 1.5 mm and the thickness of the coatings ranges from 10 to 100 μm); the physicochemical stability of the materials of the fuel particles (uranium and thorium oxides and carbides, silicon and zirconium carbides, pyrocarbon); high radioactivity; and extremely high gradient of the concentration of fuel and fission products in the protective coatings. The methods that have been developed for measuring the distribution of the fissioning material and the fission products can be divided into two groups: a) finding the distribution of the components sought over the meridional section of

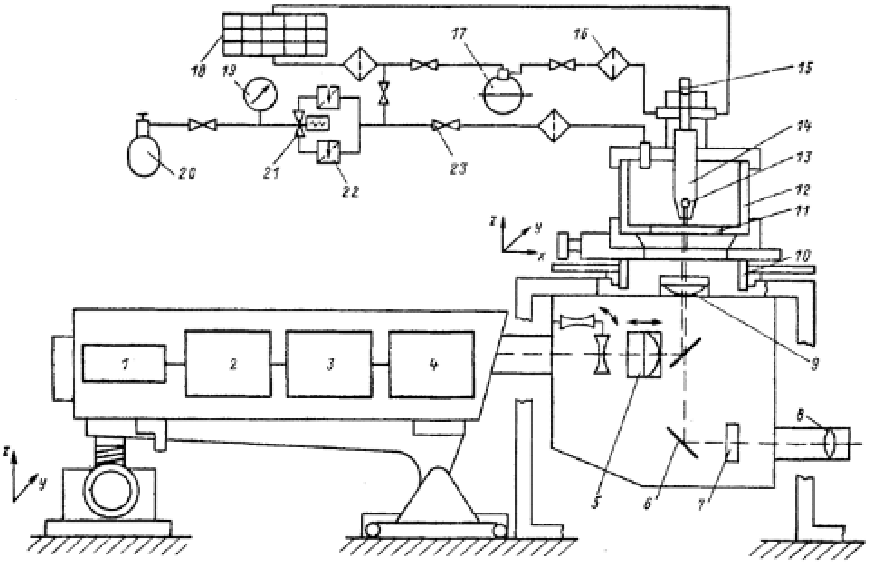

Fig. 1. Diagram of laser unit for layerwise sampling: 1) working body (yttrium aluminum garnet); 2) aperture diaphragm; 3) acoustooptical shutter; 4) electromechanical shutter; 5) telescopic system; 6) mirror; 7) light filter; 8) eyepiece; 9) focusing objective; 10) coordinate table; 11) input window; 12) chamber; 13) fuel particles; 14) collector; 15) illuminator; 16) aerosol filter; 17) trap with activated carbon; 18) fuel-particle storage; 19) manometer; 20) tank holding inert gas; 21) controllable valve; 22) flow regulator; 23) valve.

*Deceased.

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