

Research of the structure of cement materials with the addition of graphite for storage of radioactive waste by neutron radiography and tomography

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Nowadays, the question of radioactive waste storage is relevant. Special storages are being created for this which require constant monitoring of structural wear. The new categories of cement are being used for extending the lifetime of such storage. Particular attention is paid to the corrosion resistance of reinforcing materials of concrete structures under different environmental conditions, as well as their micro pore structure, which is formed at an early stage of solidification of cement .

The experimental neutron scattering methods obtained to detailed data on phase analysis or features of the crystal structure, formation of nanoparticles and grains inside the matrix, aging, cracks and pore evolution. They are used to determine the structural characteristics of cement materials and concretes and allow us to understand the nature and origin of the mechanical and chemical properties of cement, predicting the functional properties, presenting ways to optimize the composition of new cement materials.

Experiments on neutron radiography were carried out at the installation of NRT, neutron diffraction at the DN-12 diffractometer in the high-flux pulsed reactor IBR-2.

The formation of cracks at the point of contact of the aluminum container and cement paste was found. The dependence of the attenuation coefficient of the neutron beam of cement paste over time is constructed. Anomalies in the behavior of neutron beam attenuation related with the beginning of the process of gas and water vapor release during cement paste solidification were revealed and a lot of pores found inside dried cement.

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