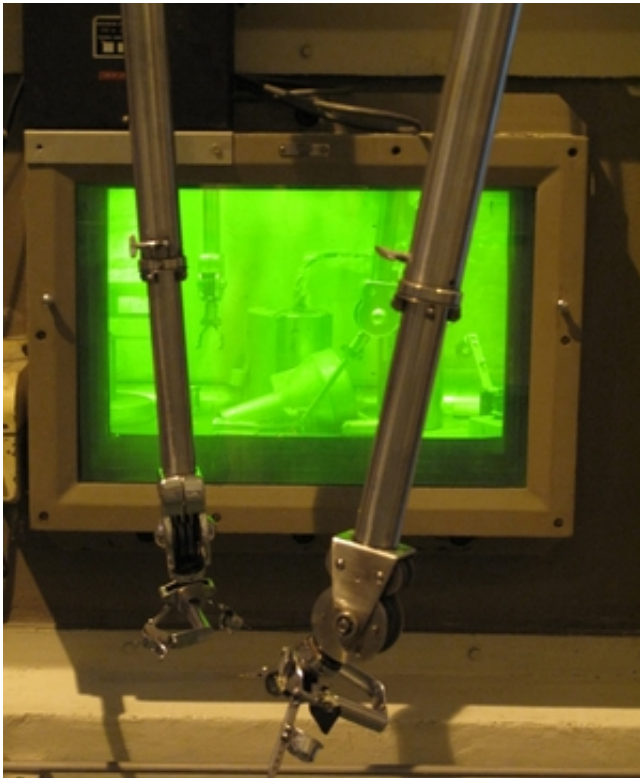


Scientists will modernize technology of anti-radiation concrete shields

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Hot chamber at the MARIA research reactor in Źwierk.
Credit: NCBJ

PAN Institute of Fundamental Technological Research, NCBJ, Institute of Ceramics & Building Materials, and the Hydrobudowa-1 company are commencing a 3.2 million PLN worth joint research project to modernize radiation concrete shields. The project is welcomed by all companies that are likely to participate in development of the first nuclear power plant in Poland.

Objective of the "Durability and effectiveness of [concrete](#) shields against ionizing radiation in nuclear facilities" project is to develop a new technology of producing shielding concrete of improved functionality. The technology would allow to manufacture better concrete shields against

ionizing radiation used in [nuclear power plants](#), radioactive waste repositories, nuclear chemistry labs, oncology hospitals, and practically in every room where a medical or industrial accelerator is operated. The project outcomes should include technical assessment criteria on basis of which new standards and regulations (reflecting current knowledge) might be elaborated.

Factors that must be taken into account by experts working on new technology of producing shielding concrete include selection of materials to be used to prepare fresh concrete, technology of mixing, [technology](#) of curing the mix, concrete tribological properties and microstructure, concrete shielding properties for various types of ionizing radiation. Research on impact of intense beams of gamma and neutron radiation on samples of the tested new concretes will be done at the MARIA research reactor operated in Źwierk. Concrete used over 50 years ago to build another Źwierk research reactor (EWA, now decommissioned after more than 30 years of operation) will be sampled and analysed as well to complement the picture. Concrete recipes most promising in view of the obtained results of lab tests and computer simulations will be selected for further industrial-scale tests. Next, the most successful recipes will be used to produce shielding concretes of which some massive blocks and test shields of a size comparable to size of real shields will be produced and verified. Final outcomes of all performed tests/analyses should allow to formulate technical guidelines and assessment criteria, on basis of which standards/regulations in force and manufacturing recipes might be updated.

For a long time concrete has been a key material used to construct shielding against penetrating [ionizing radiation](#). Recent renaissance of interest in impact of the radiation on long-term stability of concrete microstructure and tribological properties was stirred by some reports on unexpected damage of some concrete elements of the

Seabrook (Canada) [nuclear power](#) plant and concrete quality defects discovered at the Olkiluoto (Finland) nuclear power plant development site.

Provided by National Centre for Nuclear Research

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