Use of short-term radionuclides and development of detection methods for tracer test applications

MILAN ZUNA[1*], DAVID DOBREV [1], VÁCLAVA HAVLOVÁ[1], PAVEL KŮS[2], DANIELA DOUBRAVOVÁ[3], JAN JAKŮBEK[3] PETR PARMA[4]

[1]UJV Řež, a.s., Hlavni 130, Řež, 250 68 Husinec, Czech Rep.
[2]Research Center Rež, Hlavni 130, Řež-Husinec, CZE.
[3]Advacam s.r.o, U Pergamenky 12, Praha 7, CZE
[4]Technical University in Liberec, Studentská 6, Liberec, CZE

The main aim of the project presented is the utilization of short-term radionuclides, which can be used primarily (within the project and its applications) for tracer tests, simulating transport of contaminants (radionuclides, heavy metals, nanoparticles) that are relevant for the safety assessment of radioactive and toxic management. The research is focused on radio-tracers in various forms (solution/nanoparticles) used for specific purposes and on developing advanced detection techniques for their monitoring and display. The miniature imaging detectors of the Timepix family with thick CdTe or CZT sensor are being developed and optimized. Moreover, the aim is also potential 3D visualization of the radioactivity distribution in the studied rock samples with respect to the sorption sites in the rock and transport pathways.

Production of short-term radionuclides is carried out on the LVR-15 light water reactor (CV Řež) with an operating capacity of up to 10 MW. The tracers and procedures of the detector arrangement have the potential to bring a new solution in the process of monitoring transport in the environment. Nevertheless, several factors have to be taken into account within research and development in the field of advanced materials, used for simulation of contaminant movement, namely:

- radioactive waste minimization
- very low detection limits of radioactive substances
- expanding the portfolio of usable tracers
- expanding the portfolio of potential detection methods and their application in other industrial fields

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