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Application of geopolymers in management of problematic radioactive waste

In the context of decommissioning of many various NPPs worldwide and also a remediation of old legacy sites, it is necessary to process various problematic waste streams, which have been stored for many years, and for their properties were not processible by classical technologies. These include solid and liquid wastes, in varying quantities, sometimes located in a variety of difficult-to-access locations across large sites. The longer these RAWs are stored, the harder they can be processed - both from technical and economical point of view. The general trend in the world is therefore gradual replacement of conventional radioactive waste processing technologies by new, more efficient and more versatile ones.
There is a portfolio of methods to safely treat these materials in readiness for long term storage or disposal. The choice of an appropriate method depends on various aspects and influencing factors such as the categorization of the waste to be treated in terms of radioactivity, its chemical and physical properties and homogeneity. The decision-making also includes security aspects, economic issues, availability and sustainability of raw materials. Moreover, the final product processed by this technology must comply with the Waste Acceptance Criteria for disposal or storage and the whole process must be approved by the competent supervisory authorities.
Encapsulation of the waste using geopolymer matrices (e.g. Jacobs'SIAL®) is an example of new generation waste solidification technology, that offers a safe and cost-effective alternative conditioning technique.
The process is based on polycondensation reaction of aluminosilicate materials (solid phase) in a basic medium (liquid phase) at room temperature and pressure, producing a crosslinked, inorganic geopolymer which has good physical strength, hardening characteristics, leachability performance, radiation stability, biodegradability, flammability, explosivity and stability in frost.
The SIAL® geopolymer solidification technology now has a track record of over 20 years which includes ongoing research and development
In this presentation we aim to summarise the most interesting performance records of this technology, the applied mobile devices as well as the characteristics of final products.

Do you wish to participate as a Young Professional?

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