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Ambient-Cured Geopolymers for Low Level Nuclear Waste Storage

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Radioactive materials are used for several key applications in Australia, and resultantly, ~4248 m³ of low level and 656 m³ of intermediate level waste are currently stored on site. The present work investigates the development of an ambient-cured geopolymer composition for storage of low level radioactive wastes. These geopolymers were fabricated by ambient curing of mixtures of fly ash and blast furnace slag with an alkaline activator. Samples were fabricated both with sand (mortar) and without sand (paste). The cured compositions (25x25x25 mm³ cubes showed high compressive strengths of ~100 MPa. Microstructural and mineralogical characterisation was conducted using scanning electron microscopy and X-ray diffraction analysis. The samples will be subjected to gamma irradiation to simulate exposure from incorporated Cs-137 for a few hundred years at ANSTO. Samples will be removed at different time points (1-12 months) and microstructural and mechanical testing will be done to assess its stability.

Summary

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