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Geopolymer materials for nuclear industry

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Geopolymers are promising materials applicable in nuclear industry. They have been tested for various applications like nuclear waste immobilisation, as a construction material, for concrete cracks reparation, etc. We have developed a synthetic route for production of versatile geopolymer material with application in a passive system of GEN IV reactor safety. Such material contains a geopolymer matrix based on alumino-silicates and a filler. The filler powder can be broadly selected according to the needs (Gd_2O_3 as neutron absorber, Al_2O_3 as refractory oxide, Fe_2O_3 as chemically active material, etc). We have characterised the products by various solid-state techniques (mechanical properties, electron microscopy, X-ray powder diffraction). Additionally, we have tested the radiation stability of the material under gamma radiation of ^{60}Co source mimicking the condition around the reactor pit during the life time of the material.

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