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New route for synthesis of Synroc-like ceramic using non-selective sorbent LHT-9

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Immobilization of bulk liquid high level waste (HLW) in Synroc ceramic is well-known reliable way for final isolation of waste from biosphere. It is proposed the alternative method of synthesis of titanate Synroc-like ceramic. Radionuclide incorporation into crystalline titanate host-phases can be provided as a result of direct radionuclide sorption from liquid HLW using non-selective sorbent –layered hydrazinium titanate (LHT-9). Such an approach allows excluding expensive multi-stage procedure of precursor preparation. The precipitate obtained after sorption can be easily transformed into Synroc-like ceramic by cold pressing and sintering in air at 1000-1100°. The highly radioactive samples of titanate ceramic loaded with 10 wt.% of real HLW were synthesized and studied at KRI hot-cell facility. Chemical durability of these samples was tested using MCC-1 static leach test (in distilled water at 90°C) and the leach rate was found to be comparable with Synroc ceramic.

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