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## Study of crystalline ceramics for immobilization of <sup>99</sup>Tc

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Technetium-99 is beta-active long-lived artificial radionuclide (half-life more than 200,000 years). Because of its long-life, high content in spent nuclear fuel, high ability to oxidize under aerobic conditions as TcO<sub>4</sub><sup>-</sup> Tc is one of the most dangerous radionuclides. Development of chemically durable host-phase for Tc disposal is important goal of research.

There are no natural minerals of Tc, which might be considered as analogues of stable Tc host-phases. Some chemical elements such as manganese, titanium, rhenium can be used as Tc-simulants. They do not reflect however chemical behavior of Tc in detail.

It was suggested to consider development of Tc host-phases with structures of spinel; pyrochlore; fluorite; garnet in three oxide systems: Fe-(Mn,Tc)-O, Zr-(Mn,Tc)-O, and (Sn,Tc)-O using different procedures of precursor preparation and ceramic synthesis conditions.

Most samples were synthesized at 1150°C in inert atmosphere from precursors doped with 5-12 wt. % Tc. Some samples were obtained in air. All the samples obtained were studied using optical and scanning electron microscopy (SEM); powder X-ray diffraction (XRD); microprobe analysis (EMPA) and static leach test in distilled water at 90°C for 28 days. Content of Tc varied from 0.5-0.8 to 3-6 wt.% in oxide host phases and from 54 to 93 wt.% in metallic inclusions. Leach rates were less than 10<sup>-3</sup> g/m<sup>2</sup>. Development of optimal methods of precursor preparation and synthesis conditions of Tc-doped ceramic are discussed.

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