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A New Method for Production of Glass-Y₂Ti₂O₇ Pyrochlore

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The actinide immobilisation research group at ANSTO has been investigating pyrochlore glass-ceramics for plutonium immobilisation. A novel method of glass ceramic preparation via a soft chemistry route has been designed recently. Significant advantages over a more traditional mixed oxide route include removal of the need for an organic solvent in synthesis and milling steps, and product devoid of potentially deficient minor phases. Glass-Y₂Ti₂O₇ pyrochlore was fabricated by sintering the mixture of glass precursor powder and (YTi)-composite prepared by a soft chemistry route. XRD and Raman confirmed phase pure pyrochlore crystallized in-situ in amorphous glass matrix at 1200°C. Pyrochlore formation in glass was independent of cooling rates and addition of metal fluorides. Glass matrix was able to accommodate/dissolve small amounts of impurities and the mean pyrochlore particle size was between 1 and 2 µm in glass.

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