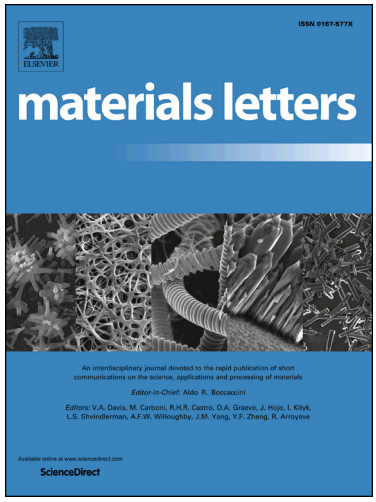

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Vitrification of U_3O_8 in iron aluminium phosphate matrices including Bi_2O_3 as uranium surrogate

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Abstract

In order to encapsulate nuclear wastes (NW) enriched in Uranium, they have been designed and obtained vitrified matrices of iron aluminum phosphates including substitution of U by Bi. These glasses have been designed and obtained formulating all from the starting binary composition: $60P_2O_5.40Fe_2O_3$ where the Fe/ P ratio was 0.67. The thermal behavior has been investigated by DTA /TG analysis and thermal expansion, as well as identification of some phases by TEM/EDS. The vitrified structures are difficult to crystallize as is the case of the (Fe+U) contents in the range of 0.50 per P atom. Glasses with Bi-oxide are less resistant to crystallization than those containing U. The glasses here investigated depict a reasonable water chemical stability due to the high percentage of P- O- Fe- O bonds and the presence of U (4+ to 6+). Lately, it has been also investigated the calcination of simulated miniplates of Si_2U_3/Al having additions of these glasses and U_3O_8 to dilute this Uranium enriched in MTR combustible (Material Testing Reactor).

Keywords: Nuclear Wastes; Vitrification; U_3O_8; Bi_2O_3; Iron Phosphate;

1. Introduction

Since time it is coming considered the vitrification as an effective way for immobilisation of nuclear wastes (NW) [1]. Much research work has been made in the last decades trying to find the optimal matrices which usually are named as "waste forms" for encapsulation of such wastes in durable and sure compounds or materials [2]. Though, since time also previous authors have considered the iron phosphate matrices as very useful for immobilization of a wide range of NW [3], the use of such type of phosphate glasses for the isolation of uranium compounds has not been