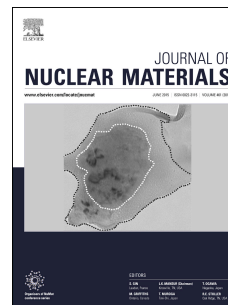


Accepted Manuscript

Effect of low dose electron beam irradiation on the alteration layer formed during nuclear glass leaching

S. Mougnaud, M. Tribet, J.-P. Renault, P. Jollivet, G. Panczer, T. Charpentier, C. Jégou



PII: S0022-3115(16)30881-9

DOI: [10.1016/j.jnucmat.2016.10.008](https://doi.org/10.1016/j.jnucmat.2016.10.008)

Reference: NUMA 49945

To appear in: *Journal of Nuclear Materials*

Received Date: 27 June 2016

Revised Date: 19 September 2016

Accepted Date: 5 October 2016

Please cite this article as: S. Mougnaud, M. Tribet, J.-P. Renault, P. Jollivet, G. Panczer, T. Charpentier, C. Jégou, Effect of low dose electron beam irradiation on the alteration layer formed during nuclear glass leaching, *Journal of Nuclear Materials* (2016), doi: 10.1016/j.jnucmat.2016.10.008.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Effect of low dose electron beam irradiation on the alteration layer formed during nuclear glass leaching

S. Mougnaud^{1*}, M. Tribet¹, J.-P. Renault², P. Jollivet¹, G. Panczer³, T. Charpentier²,
C. Jégou¹

¹CEA Marcoule, DEN/DTCD/SECM, BP 17171, 30207 Bagnols-sur-Cèze cedex, France

²NIMBE, CNRS, CEA, Université Paris Saclay, CEA Saclay, 91191 Gif-sur-Yvette cedex, France

³Institut Lumière Matière, UMR5306 Université Lyon 1-CNRS, Université de Lyon, 69622 Villeurbanne cedex,
France

* Corresponding author. Tel.: +33 4 66 79 65 07.
Email address: sarah.mougnaud@gmail.com

Keywords: nuclear glass, beta irradiation, alteration layer, glass leaching

Abstract

This investigation concerns borosilicate glass leaching mechanisms and the evolution of alteration layer under electron beam irradiation. A simple glass doped with rare earth elements was selected in order to access mechanistic and structural information and better evaluate the effects of irradiation. It was fully leached in initially pure water at 90°C and at high glass surface area to solution volume ratio ($S/V = 20\,000\text{ m}^{-1}$) in static conditions. Under these conditions, the system quickly reaches the residual alteration rate regime. A small particle size fraction (2-5 μm) was sampled in order to obtain a fairly homogeneous altered material enabling the use of bulk characterization methods. External irradiations with 10 MeV electrons up to a dose of 10 MGy were performed either before or after leaching, to investigate respectively the effect of initial glass irradiation on its alteration behavior and the irradiation stability of the alteration layer. Glass dissolution rate was analyzed by regular leachate samplings and the alteration layer structure was characterized by Raman, luminescence (continuous or time-resolved), and ²⁹Si MAS NMR and EPR spectroscopy.

Download English Version:

<https://daneshyari.com/en/article/5454378>

Download Persian Version:

<https://daneshyari.com/article/5454378>

[Daneshyari.com](https://daneshyari.com)