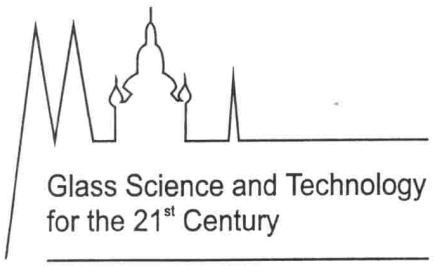

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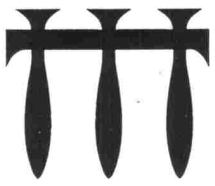

ANNUAL MEETING

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ANNUAL MEETING

A NOVEL TOOL FOR CHARACTERIZATION OF NUCLEAR WASTE GLASSES AND THEIR ALTERATION PRODUCTS

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Emanation Thermal Analysis [1] was used for characterization of thermal behavior of a nuclear waste glass, before and after the glass alteration due to hydrolytic corrosion. In the Emanation Thermal Analysis, the release of radon atoms (previously incorporated into solid samples investigated) is measured, serving as a probe of microstructure change and permeability of the samples towards radon (atom size: 0.4 nm). Changes of release rate of radon atoms from the samples of a simulated nuclear waste glass were measured continuously during heating in the air flow from 20 to 1200°C indicating microstructure changes of the glass samples. Annealing of cracks and micropores due to glass polishing as well as annealing of surface roughness was indicated in the temperature range of 300-400°C by a decrease of radon release rate. A decrease of viscosity of the virgin nuclear waste glass (in the proximity of the glass transition temperature: T_g) was indicated by the increase of the radon release rate starting at 430°C, whereas its decrease starting at 590°C corresponded to the glass softening. In the altered glass sample, covered by a gel-like corrosion products on the surface, microstructure changes accompanying dehydration and thermal decomposition of the glass corrosion products were characterized by the decrease of the radon release rate in the temperature range of 220-590°C. Mathematical modelling was used for the description of radon release rate kinetics from the labeled glass samples. The information about the thermal behavior of the glass corrosion products will be used to improve understanding the mineralogy and geochemistry of the altered products of nuclear waste glass.

Key words: nuclear waste glass, chemically altered glass, emanation thermal analysis, thermal behavior of vitrified nuclear waste

Reference

[1] Balek V.: Emanation thermal analysis and its application potential, Thermochim. Acta, **192** (1991), p.1