

## Chemical state characterization of fine alloy in borosilicate glass

Koya YAMAZAKI<sup>1</sup>\*, Isamu SATO<sup>1</sup>, Haruka TADA<sup>2</sup> and Haruaki MATSUURA<sup>1</sup><sup>1</sup> Tokyo City University, 1-28-1, Tamazutsumi, Setagaya-ku, Tokyo, 1588557, Japan<sup>2</sup> IHI Corporation, 1, Shin-Nakahara-cho, Isogo-ku, Yokohama, 235-8501, Japan

### 1 Introduction

The vitrified waste is made by mixing borosilicate glass with a solution of three kinds of liquid wastes (high-level concentrated waste, insoluble residue waste, and alkaline nitric concentrated waste). In the future, the composition of the waste solution is expected to change depending upon elongation of burn-up and using mixed oxide fuel, therefore, the vitrified waste production process may need to be flexible to accommodate the variation of these compositions. In the vitrified wastes, the yellow phase may form related to molybdate salt, and the vaporization of Ru as RuO<sub>2</sub> has also special concern [1]. However, it is still unclear about the physico-chemical behavior of Mo, Ru, Rh, and Pd atoms in the case of co-heating with borosilicate glass, waste liquid, and platinum group alloys. To understand the oxidation and vaporization behavior of the alloys in borosilicate glass, we have carried out those local structural analyses from the point view of each metal.

### 2 Experiment

The alloy used is in a composition ratio of Mo:15, Ru:65, Rh:10, and Pd:10 wt%, (ArcA). The specimen is consisted with the powdered alloy, dried liquid waste in a weight ratio of 1:2 and borosilicate glass beads. The specimen in a high purity alumina container was heated by a temperature elevation rate of 10°C/min, and kept at 1150°C for 3 hours under air atmosphere. EXAFS measurements of the Mo-K and Ru-K absorption edges of the samples before and after heating were performed at BL27B beamline using the fluorescence mode with an SSD detector.

### 3 Results and Discussion

The results of XAFS measurements for various samples are shown in Fig. 1(a, b). The feature of the XANES spectra confirms that the valence of Mo is hexavalent and the chemical form would be mainly molybdates. The EXAFS structure functions suggest that the absence of metallic species after heating. In addition, specific feature was observed in the peaks in the glass at ca. 1.8 Å. This peak could not be confirmed at molybdate, suggesting that Mo may have been mixed with the borosilicate glass as well.

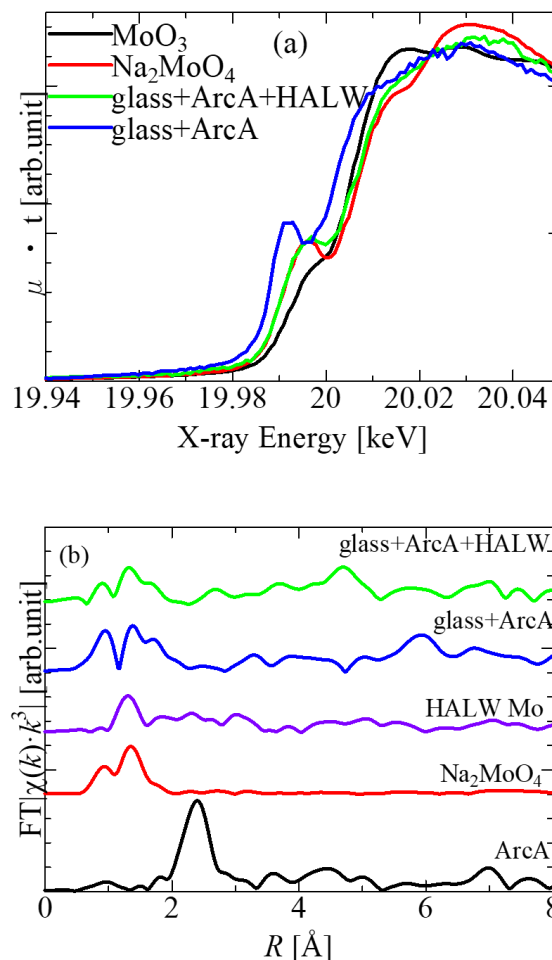


Fig. 1: (a) XANES spectra (b) EXAFS structure functions of co-heated with borosilicate glass

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### References

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- [g2281818@tcu.ac.jp](mailto:g2281818@tcu.ac.jp), [hmatuura@tcu.ac.jp](mailto:hmatuura@tcu.ac.jp)