

## Raman spectra of cesium iron silicate

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**Abstract** Cesium iron silicate were synthesized in the laboratory and then were examined by X-ray diffraction in order to confirm the purity of samples. Micro-Raman spectroscopy was applied on cesium iron silicate for identification Raman spectra.

**Keywords:** cesium iron silicate, Raman, severe accident

### 1. Introduction

Cesium is one of important fission product that releases from the core and deposits on the surface of reactor containment during severe accidents. Recently, many studies have been declared about the reaction between cesium compounds and stainless steel which is used in the primary system. However, the understanding on these reactions is still far from complete because it has a large gap on the knowledge on behaviors and characteristics of the chemical product formed in the reactions.

Kobata et al. has informed that cesium iron silicate,  $\text{CsFeSiO}_4$ , is one of possible product in the cesium compound and SUS reactions [1]. Although XRD pattern has been defined by Henry et al. [2], other spectrum such as Raman spectra and characteristics of  $\text{CsFeSiO}_4$  has not been investigated yet. The purpose of this study is to define Raman spectra of  $\text{CsFeSiO}_4$ , in order to provide some information for severe accident simulation code.

### 2. Experiment

$\text{Fe}_2\text{O}_3$  powder (99.9% purity),  $\text{SiO}_2$  powder (99.9% purity) and  $\text{CsCO}_3$  powder (99.9%) with ratio 1:2:1 were one by one dissolved in 100 ml 2M  $\text{HNO}_3$ . After stirring for 10 minutes, 150 ml ethanol was added into the solution. The mixture was dryness at  $100^\circ\text{C}$  for 6 hours by hot plate stirrer and then at  $250^\circ\text{C}$  for 12 hours by an electric furnace. The obtained powder was ground and heated at  $800^\circ\text{C}$  for 6 hours and followed at  $1000^\circ\text{C}$  for 6 hours. XRD analysis was applied after each heat treatment until there is no observable change in the powder diffraction pattern. The final powder after examining the purity by comparing the pattern with ICDD card No. 000510115. Finally, Raman spectra were defined by micro-Raman spectroscopy (Horiba Jobin Yvon, LabRAM HR-800).

### 3. Results • Conclusion

Fig. 1 shows the XRD pattern of synthesized  $\text{CsFeSiO}_4$  compared to the reference. The peaks matches all the reference pattern quite well. Raman spectrum of  $\text{CsFeSiO}_4$  is illustrated in Fig. 2. The peak positions are partially overlapping and exits from  $100 - 1100\text{ cm}^{-1}$ .

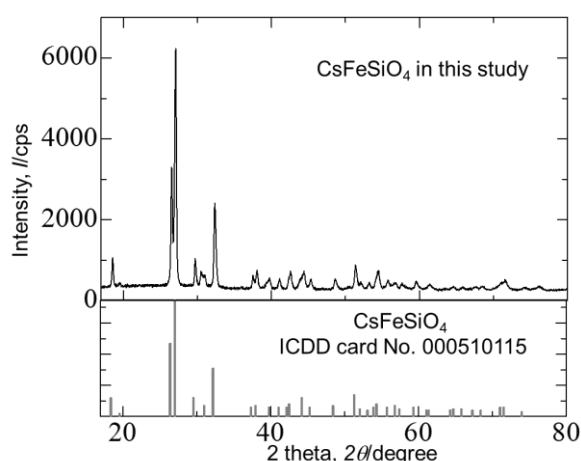


Fig. 1 XRD pattern of  $\text{CsFeSiO}_4$  compared to ICDD card No. 000510115

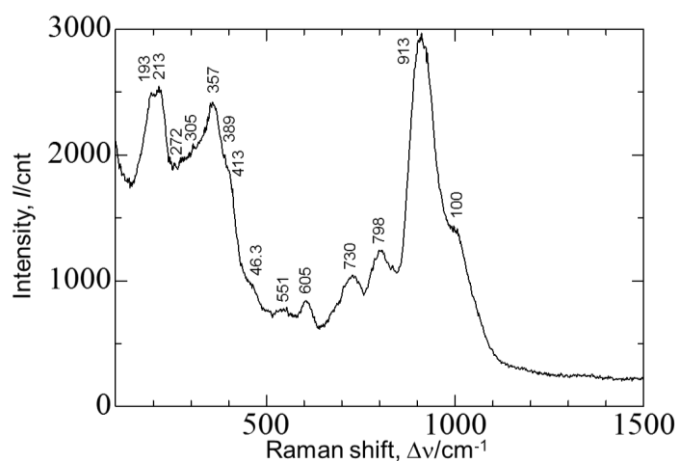


Fig. 2 Raman spectra of  $\text{CsFeSiO}_4$

### References

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