

A COMBINED CATHODOLUMINESCENCE AND MICRO-RAMAN STUDY OF PLAGIOCLASE FROM ASTEROID ITOKAWA: AN IMPLICATION FOR STUDY OF SPACE WEATHERING PROCESSES.

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Introduction: The purpose of this study is to clarify the nature as well as degree of space weathering processes on surface of asteroid Itokawa by using a multiple technological approach of scanning electron microscope-cathodoluminescence (SEM-CL) and micro-Raman spectroscopy.

Samples and Experimental Procedure: Here, we report preliminary results of CL and Raman spectral investigation of two plagioclase particles RA-QD02-0025-01 (size: 51.8 μm) and RA-QD02-0025-02 (size: 26 μm). SEM-CL (JEOL JSM 5410 LV) spectral data were recorded by a photon counting method using a photomultiplier tube (Hamamatsu: R2228) and converted to digital data. Further details of the CL equipment and analytical procedure can be found in Kayama et al. [1] and references therein. Raman spectral measurements were carried out using a LabRam Confocal Spectrometer (632 nm excitation) for the single spectrum at Max Planck Institute for Astronomy (Jena, Germany) and for the Raman mapping by a WITec Alpha 300 spectrometer (532 nm) at Department of Geology, University of Johannesburg (South Africa).

Results and Discussion: Cathodoluminescence spectral features of two plagioclase particles are centered at 2.83 eV (438 nm) and 3.08 eV (402 nm). An emission at 438 nm is assigned to defect center, whereas the peak at 402 nm is related to Al-O-Al center or Ti-center. However, it is important to note that most characteristic Mn-related activator peak for plagioclase is absent in both samples [2]. Raman spectral features have peak positions at 485, 500 and 514 cm^{-1} (bending modes) [3], which are superimposed on relatively high background fluorescence. These observations indicate that both particles have a highly disordered crystalline structure, which would be occurred by a shock event or radiation effect. However, further investigation must be done to classify these processes.

References:

- [1] Kayama et al. 2011. *Amer. Mineral.*, 96, 1238-1247.
[2] Götze et al. *Am. Mineral.*, 84, 1027-1032. [3] Wang et al. *J. Raman Spectrosc.* 35, 504-514.