

## SPACE WEATHERING OF ASTEROID ITOKAWA: MICRO-RAMAN SPECTROSCOPY OF A PLAGIOCLASE PARTICLE FROM THE HAYABUSA-1 SAMPLE RETURN MISSION.

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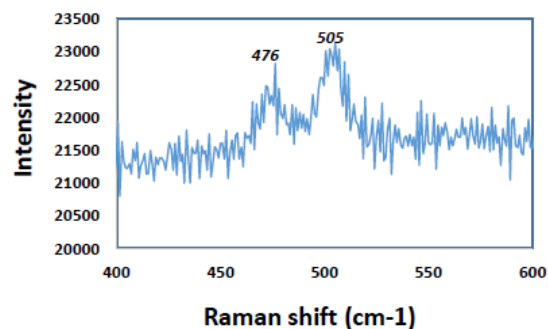
**Introduction:** We report a systematic spectroscopical investigation of a plagioclase particle (RA-QD02-0025-01) returned by the Hayabusa spacecraft from asteroid Itokawa by means of Micro-Raman Spectroscopy. The structural properties of that selected sample are used to evaluate the crystallization effects and shock wave history as well as the degree of space weathering processes of asteroid Itokawa.

**Results and Discussion:** Only one grain (RA-QD02-0025-01) was selected for the Raman analysis as it shows the best quality/crystallinity among three available specimens. Raman spectral properties obtained at 514 nm (University of Johannesburg, South Africa) excitation show two Raman vibrations at 476 and 505  $\text{cm}^{-1}$ , which are superimposed at a relatively high background fluorescence. This indicates a highly distorted structure. In order to reduce the background fluorescence, Raman spectra were taken from two spectral regions such as 400-600 and 1100-1200  $\text{cm}^{-1}$  using LabRam (Jena, Germany) facility at 638 nm excitation. Raman spectral properties exhibit three Raman bands centered at 476, 505 and 1009  $\text{cm}^{-1}$ . According to McKeown [1], Raman peaks in albite at 476  $\text{cm}^{-1}$  is related to the tetrahedral ring compression in ab-plane, at 505  $\text{cm}^{-1}$  is assigned to compression of four-membered tetrahedral rings along c and a peak centered at 1009  $\text{cm}^{-1}$  is associated with Si-tetrahedral base breathing (Figs. 1A and B). Shock pressure-induced amorphization such as occurrence of maskelynite and its Raman signatures were not observed in the selected grain (e.g., [2,3]). Raman as well as

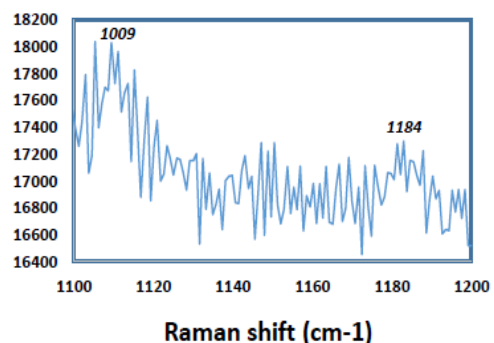
luminescence data were published in Gucsik et al. [4].

**References:** [1] McKeown et al. 2005. *American Mineralogist* 90: 1506-1517. [2] Fritz et al. 2005. *Antarctic. Met. Res.* 18: 96-116. [3] Tomioka N. et al. 2010. *Geophys Res Lett* 37: L21301. [4] Gucsik et al. 2017. *Micros Microanal*

A



B



**Figure 1.** Raman spectral features of the selected Itokawa-particle data from [4].