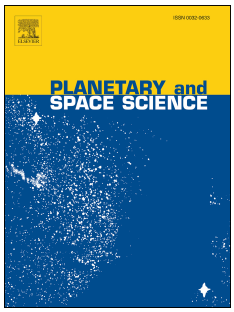
Accepted Manuscript



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PII: S0032-0633(17)30237-4

DOI: 10.1016/j.pss.2017.10.002

Reference: PSS 4404

To appear in: *Planetary and Space Science*

Received Date: 30 June 2017

Revised Date: 22 September 2017

Accepted Date: 9 October 2017

Please cite this article as: Hillier, J.K., Sternovsky, Z., Kempf, S., Trieloff, M., Guglielmino, M., Postberg, F., Price, M.C., Impact ionisation mass spectrometry of platinum-coated olivine and magnesite-dominated cosmic dust analogues, *Planetary and Space Science* (2017), doi: 10.1016/j.pss.2017.10.002.

Impact Ionisation Mass Spectrometry of Platinum-coated Olivine and Magnesite-dominated Cosmic Dust Analogues

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Abstract

Impact ionisation mass spectrometry enables the composition of cosmic dust grains to be determined in situ by spacecraft-based instrumentation. The proportion of molecular ions in the impact plasma is a function of the impact velocity, making laboratory calibration vital for the interpretation of the mass spectra, particularly at the low velocities typical of lunar or asteroid encounters. Here we present an analysis of laboratory impact ionisation mass spectra from primarily low (<15 km s^{-1}) velocity impacts of both olivine and magnesite-dominated particles onto the SUrface Dust Mass Analyzer (SUDA) laboratory mass spectrometer.

The cation mass spectra show characteristic peaks due to their constituent elements, with Mg, Al, Si, C, Ca, O and Fe frequently present. Contaminant species from the conductive coating process (B, Na, K, C, Pt) also occur, at varying frequencies. Possible saponite or talc inclusions in the magnesite particles are revealed by the presence of Si, Fe, Ca and Al in the magnesite mass spectra. Magnesium is clearly present at the lowest impact velocities (3 km s^{-1}), at which alkali metals were presumed to dominate. Peaks attributed to

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