**Analysis of Hydrous Phyllosilicates in Stardust Type B Track Analogues.** N. J. Foster[1,2], A. T. Kearsley[3], M. J. Burchell[1], P. J. Wozniakiewicz[3], J.A. Creighton[1] and M. J. Cole[1]. [1]Centre for Astrophysics and Planetary Science, School of Physical Sciences, University of Kent, Canterbury, Kent, CT2 7NH, UK. [2]Authors email address: nf40@kent.ac.uk. [3]Impacts and Astromaterials Research Centre, Department of Mineralogy, The Natural History Museum, London, SW7 5BD, UK.

**Introduction:** Much work has been carried out to analyse laboratory impacts to help us better understand the impact process into aerogel and the behaviour of mineral projectiles during capture. This can directly benefit analysis of Stardust cometary samples [1]. Here we look at the behavior of a hydrous phyllosilicate material, lizardite, during laboratory experiments replicating similar conditions to that of the Stardust encounter with comet 81P/Wild 2. Lizardite was chosen because it is of the same mineral group common in Type 1 and 2 carbonaceous chondrite meteorites and usually attributed to hydration of anhydrous mafic silicate precursors during parent-body (asteroidal) processing. The issue of whether there are hydrous minerals in a comet is clearly of interest. Another reason for using lizardite is that due to its very weak structure it doesn't survive the capture process well, thus leaving us with Type B tracks [2] i.e. with an initial bulbous cavity lined with impactor fragments. Here we look at the use of Energy Dispersive X-Ray (EDX) Analysis & Raman spectroscopy to analyse both the track walls and terminal particles.

**Method:** Laboratory analogues where made using the Univ. of Kent Two Stage Light Gas Gun (LGG) [3]. Powdered samples of lizardite in the order of 100 µm are used as the projectile. They had been well characterised and catalogued at the Natural History Museum (NHM) with a water content of ≈ 13%. $SiO_2$ aerogel with density of 60 kg $m^{-3}$ was used as the target media, although slightly higher than that of the aerogel used on Stardust, it still serves as a close approximation. All shots where carried out at a speed of 5 km $s^{-1}$, slightly lower than the Stardust encounter speed. Once tracks had been produced those for EDX were cleaved length ways down the track exposing the inside of the track for EDX analysis. Those for Raman remained intact. EDX was carried out at the NHM using a JEOL 5900 LV SEM. An accelerating voltage of 20 kV, beam current of 2 nA and a working distance of 10 mm were used. Backscattered Electron Images (BEI) and EDX spectra were recorded. Rough powder projectile samples were also looked at to check projectile composition. Both the aerogel track and rough projectile remained uncoated and were examined under low vacuum. Raman Spectroscopy was carried out at the Univ. of Kent using a Jobin-Yvon HR640 microRaman module with an Olympus BX40 microscope. The spectrometer has a 1200 gr/mm grating and a $LN_2$ cooled CCD. Illumination was from a HeNe (632.8 nm) laser delivering 10 mW (See [4] for more detail).

**Results:** EDX analysis of the track walls revealed the presence of abundant magnesium signals along its entire length, indicating that the lizardite particle had broken up during capture, resulting in the track being rich with 'debris' material from the lizardite projectile. Only a fraction of its original size is left as the terminal particle. In total 5 tracks were analysed by Raman. Of these, four exhibited good lizardite signals, whilst one displayed peaks indicative of olivine (at 824 & 857 $cm^{-1}$). The 10 raw grains studied all showed lizardite signals. Heating of the samples due to the laser power were not a contributing factor in this case, and remained to a similar range of that found in [4]. This result is a particularly significant result as lizardite is a member of the serpentine group of hydrous phyllosilicate minerals, and decomposes with loss of water at a relatively low temperature, usually with generation of olivine. This could imply that hydrous materials from comet 81P/Wild2 may not be being preserved during capture.

**Conclusion:** We have demonstrated that both EDX and Raman Spectroscopy provide us with valuable analylitical tools for investigations into the capture process. These techniques have also raised some interesting questions as to what happens during the capture process. It has shown that some mineral groups are very susceptible to the capture process, shedding material as it passes through the aerogel. In one case it has been seen that the heating effect was enough to alter hydrous materials into a different form. The temperature required for this change is only 600K and it is thought that temperatures of particles during capture may rise as high as 2050K [5].

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