

Europlanet TNA Report

PROJECT LEADER

Name: MARIE GODARD
Old address: Institut d'Astrophysique Spatiale, F-91405, Orsay, France New address since 01 Dec 2010: Astrochemistry Laboratory, NASA Goddard Space Flight Center, Greenbelt, MD 20771 E-mail: marie.godard@ias.u-psud.fr

COLLABORATORS

Name:	Affiliation:
Rosario Brunetto	IAS, CNRS, Orsay, France
Emmanuel Dartois	IAS, CNRS, Orsay, France
Date of TNA visit:	13-16 Mar 2012; 19-23 Mar 2012; 10 Apr 2012; 18-20 Apr 2012; 14-18 May 2012
No. of access days:	18
No. of days stay:	
Host laboratory:	INAF-Osservatorio Astronomico di Capodimonte TNA2: Planetary Dust Simulation Chambers - Dust Analogue Simulation
Reimbursed	Yes

Project Title – Analysis and processing of extraterrestrial samples and analogues (033-TNA2)

Scientific Report Summary.

(plain text, no figures, maximum 250 words, to be included in database)

We have analysed two particles from comet Wild 2, collected by the Stardust spacecraft (NASA). We used a combination of IR and FESEM-EDX, at the Laboratorio di Fisica Cosmica e Planetologia (LFCP), Napoli. Particles were extracted from their keystone and pressed between diamond windows to increase the quality of the spectral data. Preliminary analysis of IR data of both particles shows the presence of crystalline olivine bands with a possible minor contribution of amorphous silicate bands. Detection of olivine is confirmed by FESEM-EDX analysis, which also shows the presence of other mineral inclusions.

Full Scientific Report on the outcome of your TNA visit

Approx. 1 page

Due to some delays in the sample preparation by NASA, the visits relative to this project were performed later with respect to what previously scheduled. This implied a re-definition of the tasks. Marie Godard, previous leader of the project, moved to the USA and could not participate to these visits. Consequently, Rosario Brunetto and Emmanuel Dartois conducted this project. Visits were performed by R. Brunetto.

In this set of experiments we have analysed two particles from comet Wild 2, collected by the Stardust spacecraft

(NASA). We used a combination of IR and FESEM-EDX, at the Laboratorio di Fisica Cosmica e Planetologia (LFCP), Napoli. The two particles, provided by NASA, Johnson Space Center / Astromaterials Curation Laboratory, were named C2112,7,171,0,0 (TP2) and C2112,9,171,0,0 (TP3). There were extracted from their keystone (Fig. 1, left panel) and pressed between diamond windows (Fig. 1, right panels) to increase the quality of the spectral data by overcoming the diffraction limitation and minimizing light scattering effects from particles of a global size similar to the wavelength of the observation. All analyses were performed on the pressed particles after the top diamond windows were removed, releasing the pressure applied for crushing. Spectra of the diamond substrate and the surrounding aerogel were also acquired.

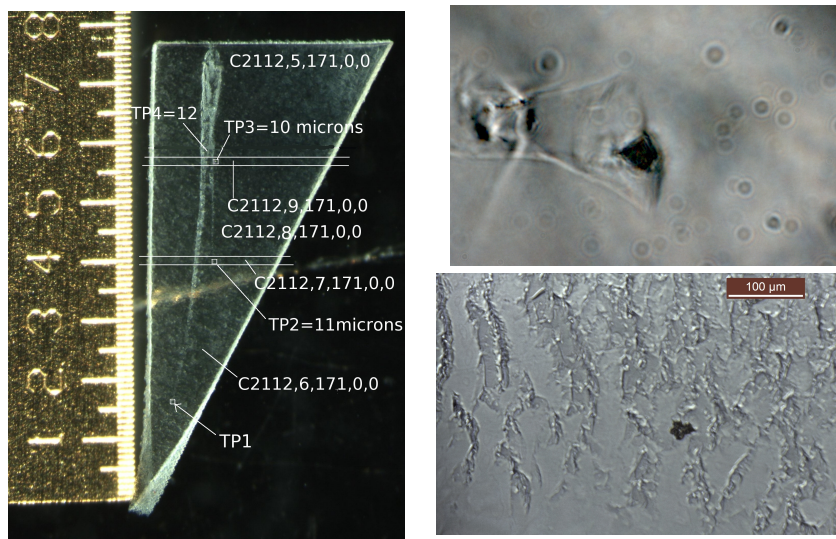


Fig. 1. Left panel: optical image showing keystone from which TP2 and TP3 were extracted (NASA). Right panels: optical images of TP before (top) and after (bottom) crushing in the diamond cell.

Infrared spectra have been acquired with a microscope attached to a FTIR interferometer (Mod. Bruker Equinox-55) in the range 7000–600 cm^{-1} and spectral resolutions between 4 and 8 cm^{-1} . FESEM and EDX analyses have been performed using a ZEISS Supra FESEM. For FESEM images we have used low accelerating voltages (1-2 kV). EDX mapping have been performed using an Oxford INCA Energy 350 system attached to the FESEM with a Si(Li) INCA X-sight “PREMIUM” detector at an accelerating voltage of 10 kV.

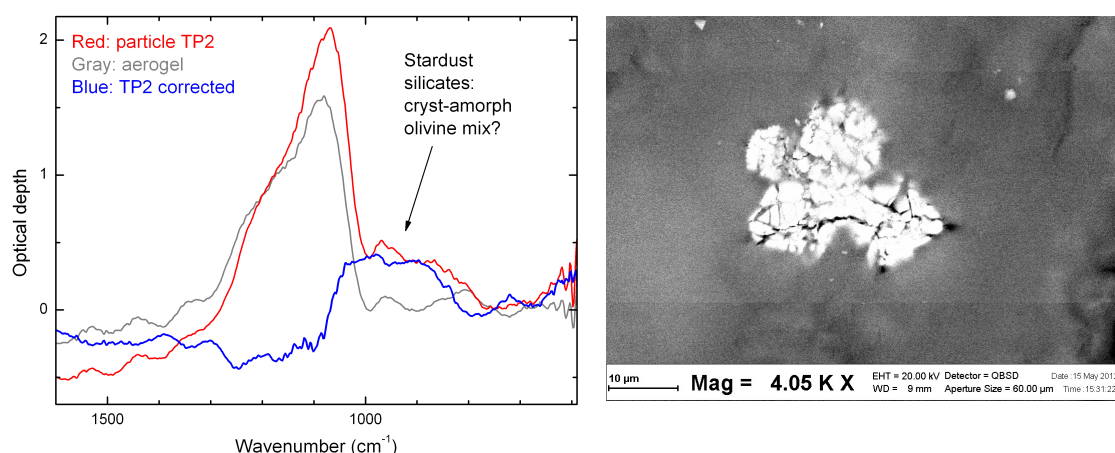


Fig. 2. Left panel: IR spectra of particle TP2, showing the presence of olivine bands at $\sim 10 \mu\text{m}$. Right panel: FESEM image (BSE) of particle TP2 and surrounding aerogel.

Preliminary analysis of IR data of both particles shows the presence of crystalline olivine bands with a possible minor contribution of amorphous silicate bands. Detection of olivine is confirmed by FESEM-EDX analysis, which also shows the presence of inclusions of other minerals. Data are still under analysis. Results will be merged with other analysis performed in Orsay and Catania, and published in a paper leaded by A. Rotundi (currently in preparation).

Please include:

- Publications arising/planned (include conference abstracts etc)

Rotundi et al., 2012, in preparation.

- Host approval

I confirm that the previous report is an accurate description of the scientific activity performed by Dr. Rosario Brunetto during his TNA visits at the Laboratorio di Fisica Cosmica e Planetologia in Napoli.

Vito Mennella