Sample Results Summary Sheet

Please return this form to the Curator for each allocated Sample

Sample ID: RA-QD02-0022 (One among the four original samples for space weathering observation)

PI: Takaaki Noguchi

Type and date of analysis performed:

Potted butt: Field emission scanning electron microscopy (FE-SEM) at Hitachi High-technologies Co. on Feb. 3, 2011. (Without carbon coating)

Potted butt: Scanning electron microscopy (SEM) at Ibaraki University on Feb. 15, 2011.

Ultrathin sections: Scanning transmission electron microscopy (STEM) at Hitachi High-technologies Co., on Feb. 3 and Dec. 27, 2011.

Elements or phases identified: (Mg, Si, olivine, pyroxene, aromatic carbon, etc.)

Olivine and low-Ca pyroxene

Nano particles were not observed on the surface of the above minerals in ultrathin sections.

Thin (~2 nm) surface layer enriched in Si and contains Na, K, and Cl as well as Mg and Fe.

Contaminant phases identified: (Al, SUS, carbon particles, etc.)

Not detected.

Sample handling: (e.g. exposed in atmosphere, embedded in resin, polished, sliced by FIB or UMT)

Embedding in epoxy resin in N_2 purge environment at the curation facility, ISAS/JAXA on Jan. 18, 2011.

Transportation by using a N_2 purge box from ISAS/JAXA to Ibaraki University on Jan. 21, 2011.

Ultramicrotomy at Ibaraki University in an N_2 purge glove box on Feb. 2, 2011. The ultrathin sections on TEM grids were preserved in an N_2 purge glove box. Ultrathin sections on TEM grids and a potted but were in an aluminum-coated plastic bag and the bag was sealed thermally.

Carbon coating of the potted butt at Ibaraki University on Feb. 15, 2011. The potted butt was preserved in a vacuum desiccator just after carbon coating.

After SEM observation, the potted butt was embedded again for further main stream analyses on Feb. 17, 2011. Then, it was polished manually during February. It was transferred to Kyushu University and then Hokkaido University. It was returned to Ibaraki University on Jul. 6, 2011. It was kept in a vacuum desiccator.

State of sample pre-analysis: (e.g. N_2 hold, atmosphere, resin embedded, polished section, UTS) (please describe treatments and/or modifications for the sample you have done before your analysis)

STEM observation: ultramicrotomed sections embedded in epoxy resin.

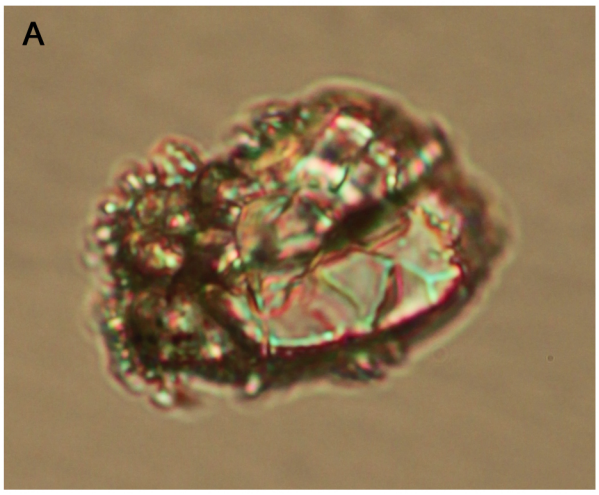
SEM observation: Carbon coated potted butt

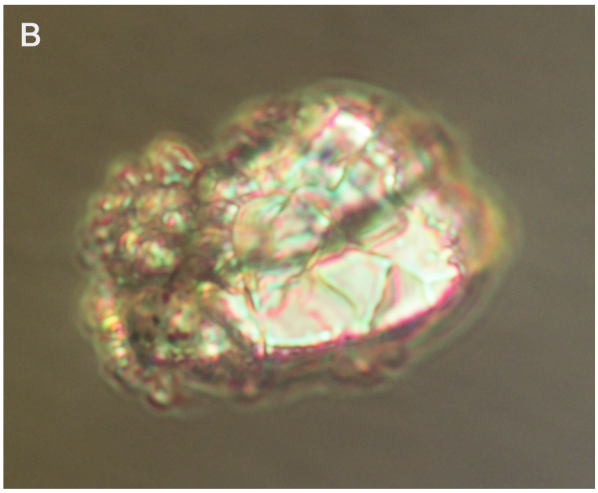
State of sample post-analysis:

All the ultrathin sections and FIB sections were preserved in a vacuum desiccator.

Analysis data Notes: (summary of the attached analysis data and/or images)

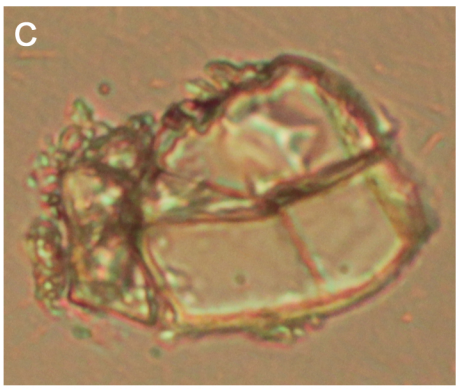
Please see the summary seat of this particle.

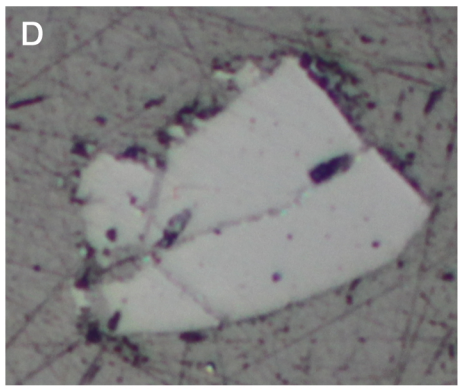




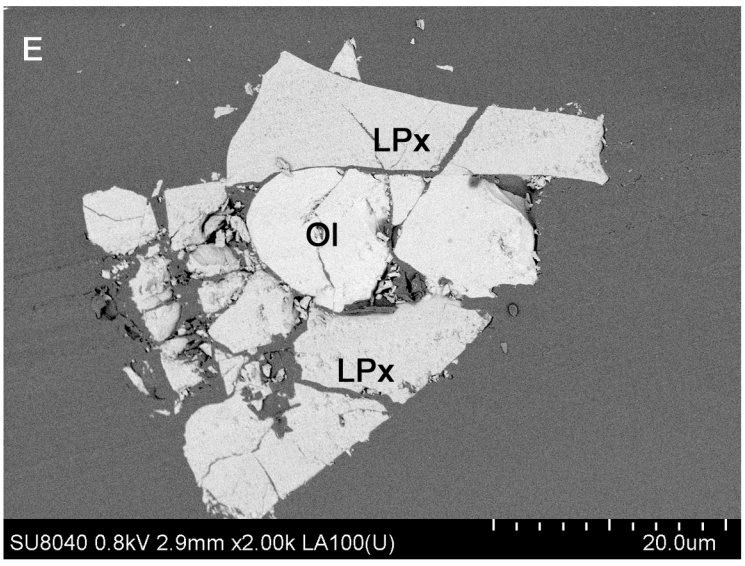
Sample handling history
1. Embedding in epoxy resin at ISAS/JAXA on Jan.18, 2011
2. Transport by using N_2 purge box on Jan. 21, 2011
3. Ultramicrotomy at Ibaraki Univ. on Feb. 2, 2011
4. Potted butt: FE-SEM at Hitachi High-tech., on Feb. 3, 2011 (without carbon coating)
5. Ultrathin sections: FE-STEM at Hitachi High-tech., on Feb. 3, 2011
6. Carbon coating of PB at Ibaraki Univ. on Feb. 15, 2011
7. Potted butt: SEM at Ibaraki Univ. on Feb. 16, 2011
8. Re-embedding of PB at Ibaraki Univ. on Feb. 17, 2011
9. Manual polishing at Ibaraki Univ. during Feb.
10 Ultrathin sections: FE-STEM at Hitachi High-tech., on Dec. 27, 2011

Processes No. 8 and 9 were performed in the earth's atmosphere, processes No. 1 to 3 were performed in N_2 atmosphere (<0.1% O_2, <-50 °C DT).





Samples (1) Potted butt: RA-QD02-0022, (2) Ultrathin sections: RA-QD02-0022-1 to 3



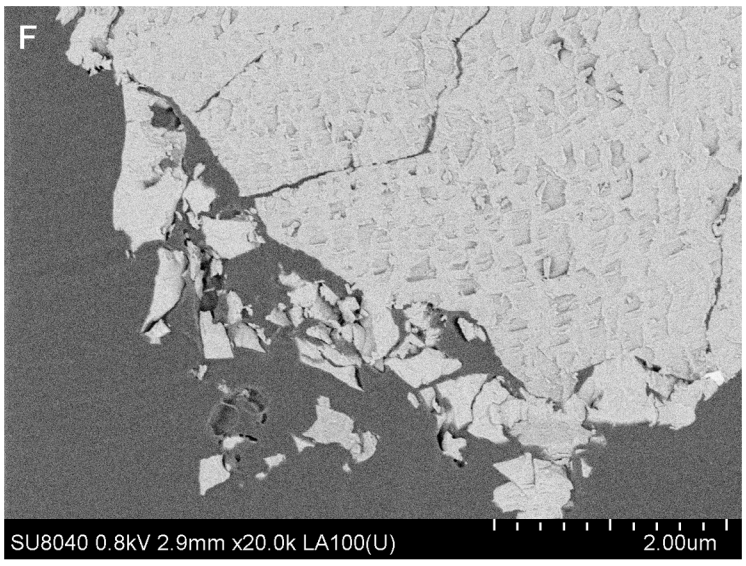


Figure caption A and B) Before Ultramicrotomy: A) open nicol, B) cross nicol (before 3).
C) and D) Potted butt: Optical photomicrographs after manual polish (open and reflected) (9).
E) and F) BSE images of PB (4). Abbriviations; Ol: olivine, LPx: Low-Ca pyroxene. Striations and dimples are artifacts formed during ultramicrotmy. Figure F is an enlarged image of Figure E. Many angular fragments attach on the surface of the main body of RA-QD02-0022.

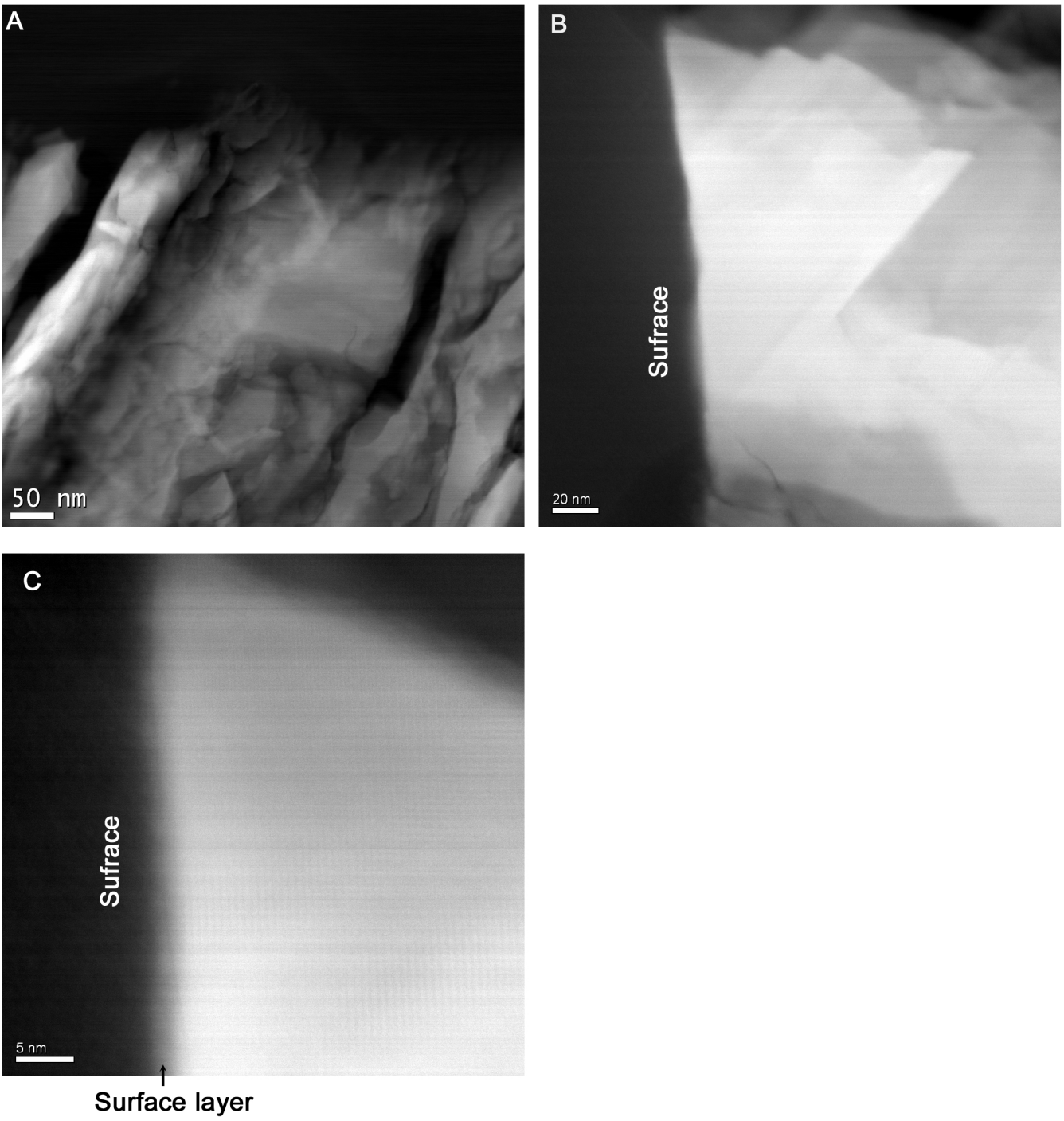


Figure caption A) to C) HAADF-STEM images of the surfaces of low-Ca pyroxene in RA-QD02-0022-1. A) There is no nanoparticle-bearing rim on this Itokawa dust particle. B) An edge-on image of the surface. It is obvious that there is no nanoparticle-bearing rim. C) An enlarged image of Figure B. This image shows a quite thin (~2 nm thick) surface layer on low-Ca pyroxene. The layer is enriched in Si and contains Na, K, and Cl as well as Mg and Fe.