

Sample Results Summary Sheet

Please return this form to the Curator for each allocated Sample

Sample ID: RA-QD02-0054

PI: Takaaki Noguchi

Type and date of analysis performed:

Potted butt: Scanning electron microscopy (SEM) at Ibaraki University on Feb. 16, 2011

Ultrathin sections: Scanning transmission electron microscopy (STEM) at Hitachi

High-technologies Co., on Feb. 25 and Jul. 17, 2011

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

Olivine

Nano particles were observed on the surface of olivine in ultrathin sections and a FIB section.

Nano particles on the surface contain sulfur.

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

Aluminum, Tin oxide nanoparticles were observed at the boundary of the cross section of the particle and the embedding epoxy. Please see the summary seat of this particle.

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

Embedding in epoxy resin in atmosphere at Ibaraki University on Feb.2, 2011 (Because this sample has been already enclosed in a thin layer of epoxy resin at the curation facility during preparation for the mainstream analyses, this sample was not exposed directory to the earth's atmosphere.)

Ultramicrotomy at Ibaraki University in atmosphere on Feb. 12, 2011. The ultrathin sections on TEM grids were preserved in a vacuum desiccator just after ultramicrotomy.

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.

State of sample pre-analysis: (e.g. N2 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.

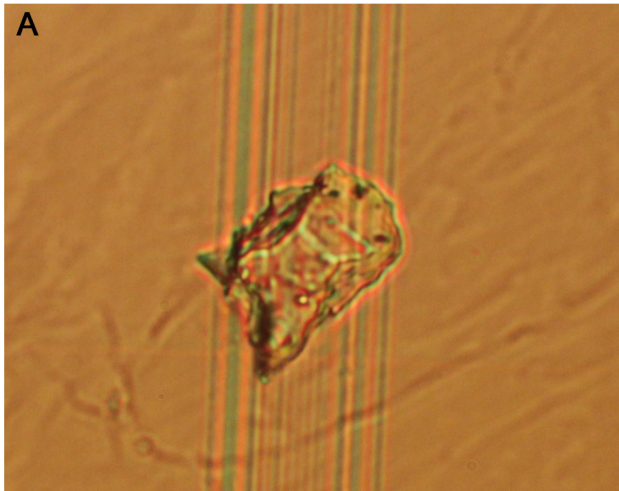
SEM observation: Carbon coated potted butt.

State of sample post-analysis:

All the ultrathin sections were preserved in a vacuum desiccator at Ibaraki University.

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

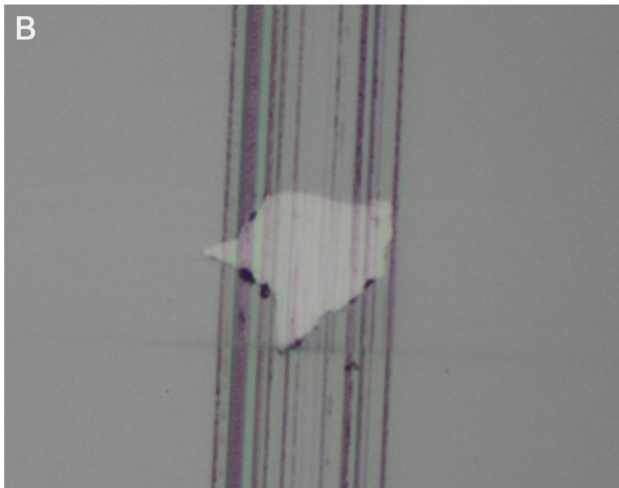
Please see the summary seat of this particle.



Sample handling history

1. Embedding in epoxy resin at Ibaraki Univ. on Feb.2, 2011
2. Ultramicrotomy at Ibaraki Univ. on Feb. 12, 2011
3. Potted butt: Carbon coating at Ibaraki Univ. on Feb. 15, 2011
4. Potted butt: SEM at Ibaraki Univ. on Feb. 16, 2011
5. Ultrathin sections: STEM at Hitachi High-tech., on Feb. 25, and Jul. 17, 2011
6. Potted butt: re-embedding on Feb. 17. 2011 at Ibaraki U.
7. Manual polishing during Feb. at Ibaraki U.

All the processes were performed in atmosphere.



Samples (1) Potted butt: RA-QD02-0054, (2) Ultrathin sections: RA-QD02-0042-4 to 5

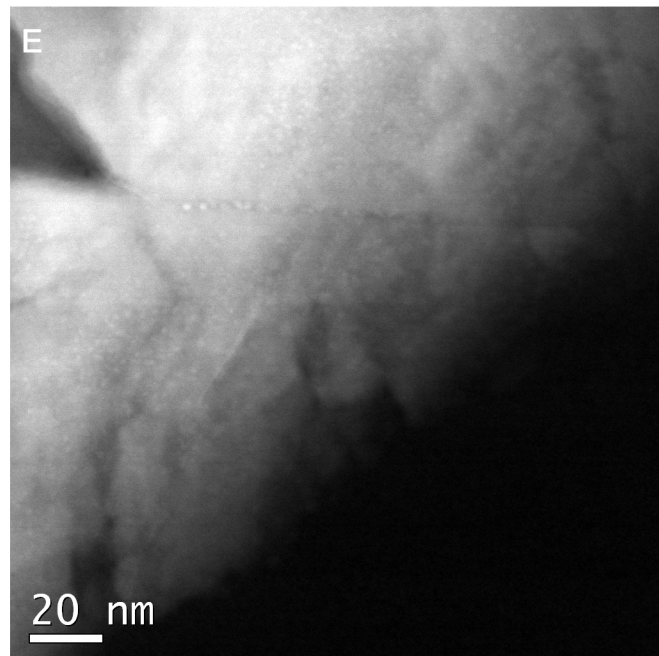
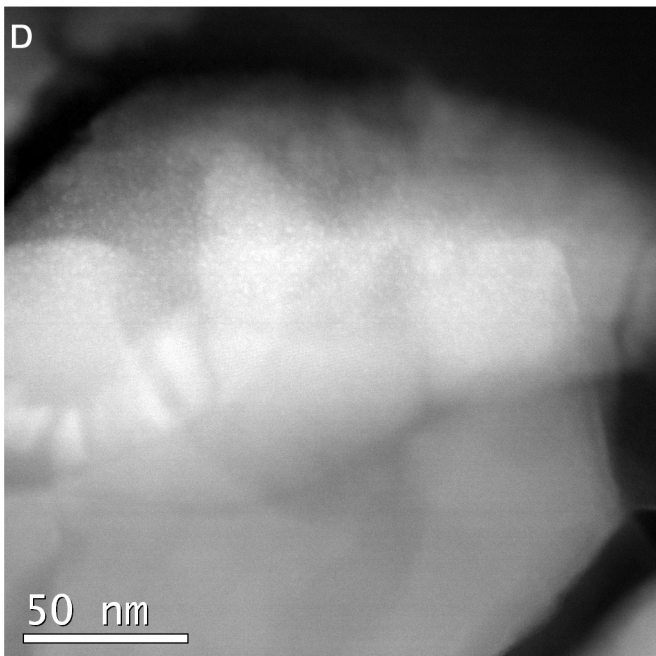
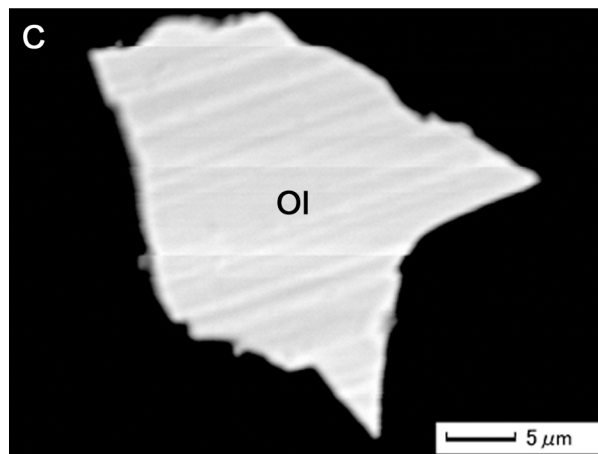


Figure caption A and B) Potted butt: Optical photomicrographs after UM (open and reflected) (2). C) BSE image of PB (4). Abbriations; Ol: olivine, Striations are artifacts formed during ultramicrotmy. D and E) HAADF-STEM images of the surfaces of olivine in RA-QD02-0054-4 (5). Figure D shows a cross section observed from an oblique direction. Abundant nanoparticles are observed in the surface layer (~50 nm thick). Figure E shows the face-on image of nanoparticles on the surface of olivine.