

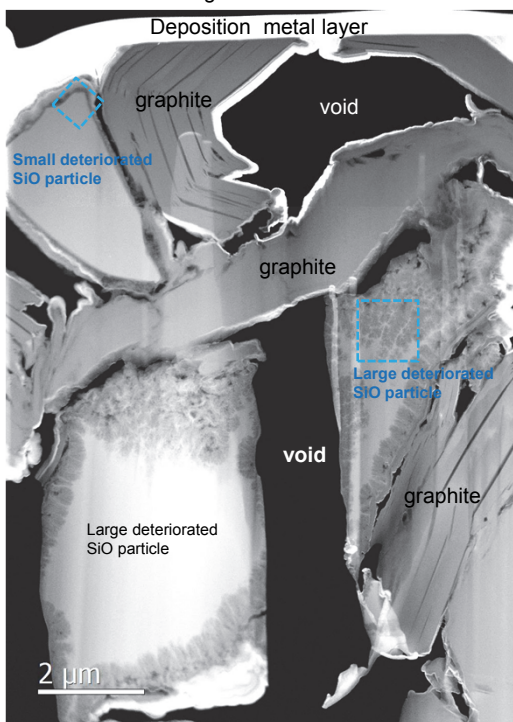
Microstructure analysis for SiO anode of lithium ion battery by STEM

Cs-corrected STEM can analyze crystal structure, elements distribution and chemical states at ultra-fine area for deteriorated SiO particle of lithium ion battery.

Sample

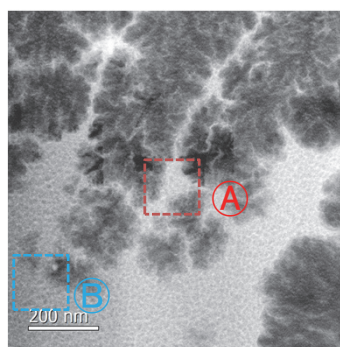
- anode : SiO / artificial graphite / SBR / CMC
- cathode : LiCoO₂ / conductive assistant / PVDF
- Number of cycles : 500 cycles
- dismantled voltage : 2.7V discharge state

HAADF-STEM image

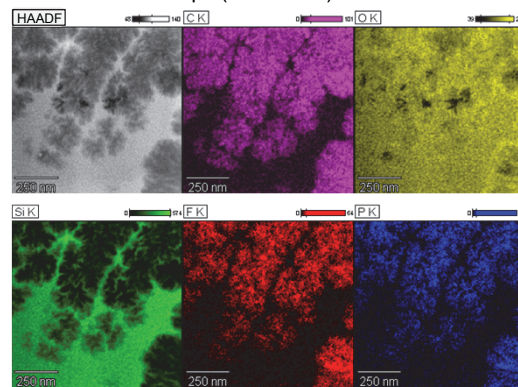


Large deteriorated SiO particle

HAADF-STEM image

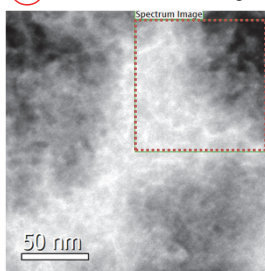


EDX element maps (net counts)

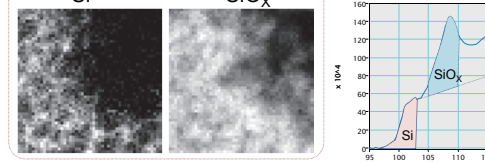


C, O, F, P were detected from the quality changed domain of the SiO particle surface.

A HAADF-STEM image

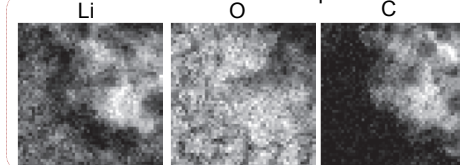


EELS chemical maps



The SiO particle had surface oxide film.

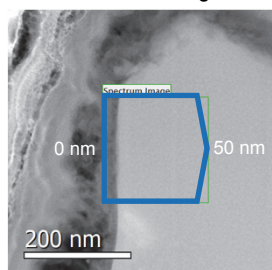
EELS element maps



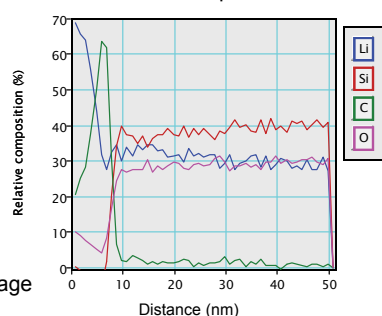
Lithium was not detected from the surface oxidation film.

Small deteriorated SiO particle

HAADF-STEM image

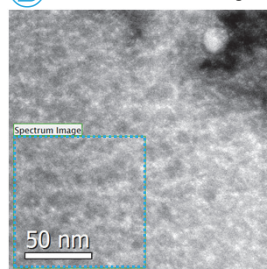


EELS line profile

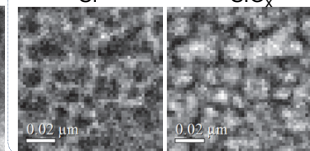


Lithium existed slightly rich at the surface.

B HAADF-STEM image

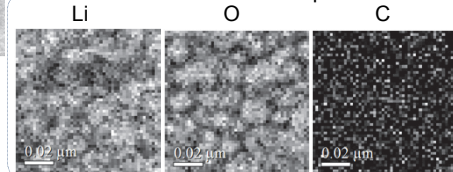


EELS chemical maps



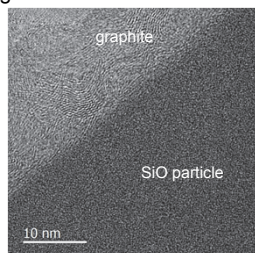
Sea-island structure of SiO/Si were observed.

EELS element maps



Lithium was detected in SiO domains.

High resolution BF-STEM image



The SiO particle was amorphous structure. There was graphite on the surface.

STEM-EDX and EELS can analyze the microstructure, surface state and Li distribution of SiO particle in detail.