

Owari Laboratory

[Three-Dimensional Atom Probe(3DAP)]

[High spatial resolution 3D analysis of element distribution using focused beams]

Institute of Industrial Science, Department of Material and Environmental Science

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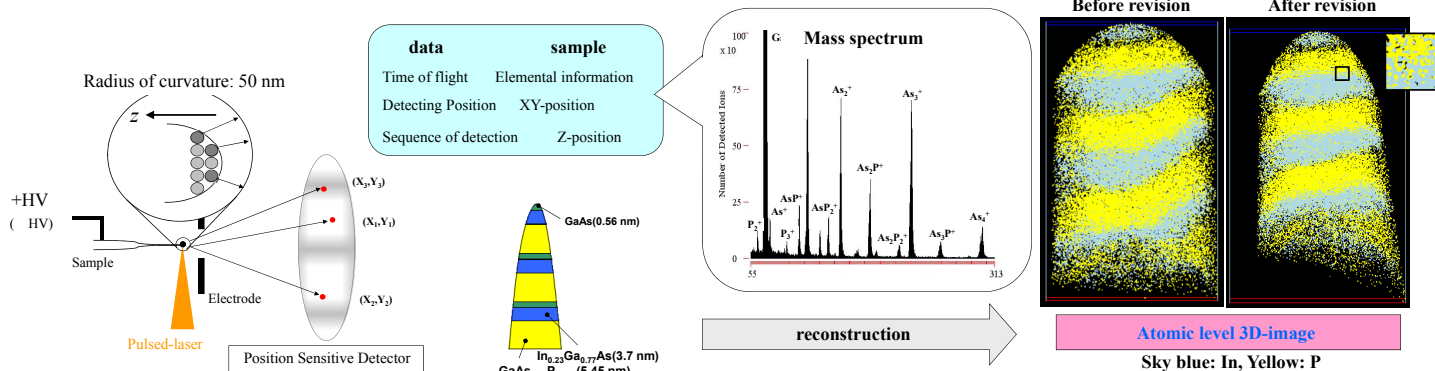
Research topic ● micro and nano material analytical chemistry

Department of Applied Chemistry

Three-Dimensional Atom Probe(3DAP)

Be-B05

Atom probe tomography enables the quantitative chemical analysis of nanostructured materials with a nearly atomic scale. By carefully controlled field evaporation, individual atoms are removed from a needle-shaped sample and their time of flight and detected positions are determined. The atoms are identified by mass spectroscopy and their geometric origin within the specimen is also reconstructed. Currently, further clarification of measurement principles and improvement of reliability by utilization of principles are under studied.



Introduction of revision algorithm of laser asymmetry

Before revision After revision

Atomic level 3D-image

Sky blue: In, Yellow: P

High spatial resolution 3D analysis of element distribution using focused beams

FIB-SIMS(Focused Ion Beam Secondary Ion Mass Spectrometry)

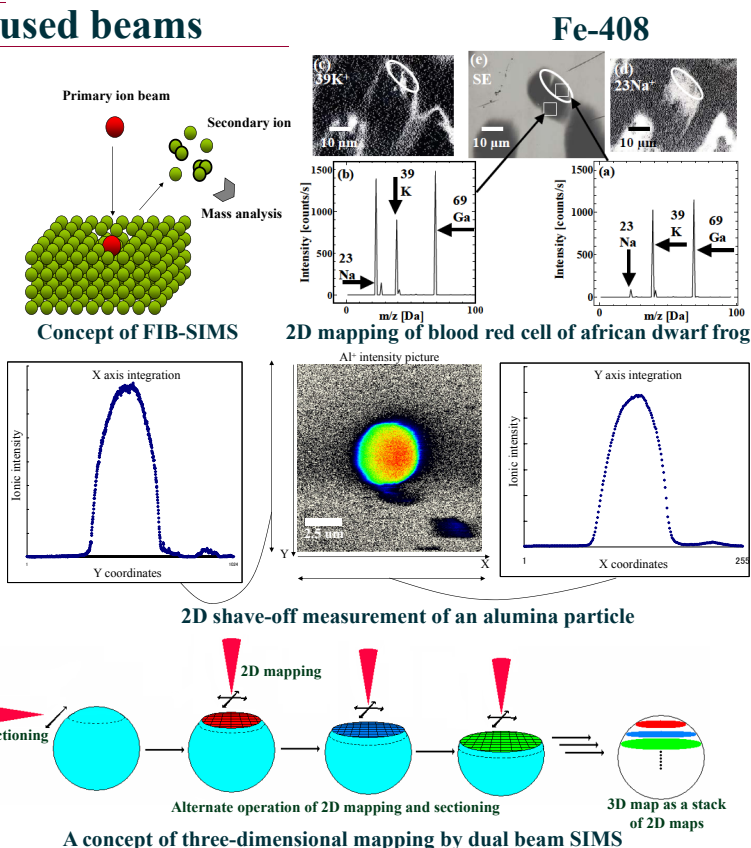
FIB-SIMS is one of surface analytical methods, which can obtain element distribution in micro region of sample by exposing Focused Ion Beam (≈ 50 nm in diameter). Two-dimensional information mapping of element distribution of sample surface can be obtained by scanning sample surface with focused ion beam.

2D Shave-off

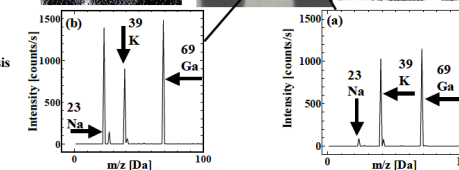
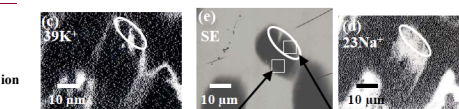
Shave-off is the scanning method of ionizing sample entirely by scanning sample surface with edge of focused ion beam. Two-dimensional information mapping by shave-off method can realize higher spatial resolution (< 20 nm) than beam diameter (≈ 50 nm). Obtained ionic strength shows the element content in each point.

Dual beam SIMS

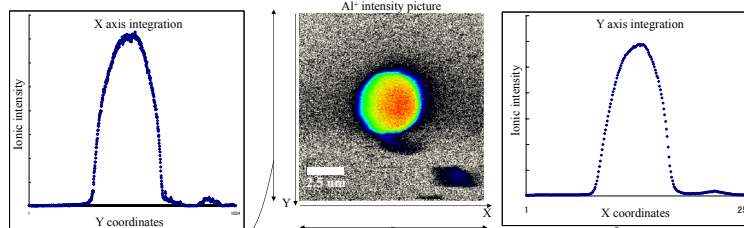
Dual Beam SIMS is the three-dimensional analytical method by two beams located at a right angles. Three-dimensional information mapping of element distribution can be obtained by two-dimensional information mapping and sectioning with the two beams alternately.



Fe-408



2D mapping of blood red cell of african dwarf frog



2D shave-off measurement of an alumina particle

