

High sensitive elemental imaging of polymer and biological material by LA-ICP-MS

Laser Ablation Inductively Coupled Plasma Mass Spectrometry(LA-ICP-MS) gives us information on trace-level metal with higher sensitivity than other methods. Furthermore, elemental imaging is available for the cross section of biological material as well as polymers.

Principle of LA-ICP-MS

The surface of solid sample is sputtered by a laser beam and its particles are introduced into ICP-MS.

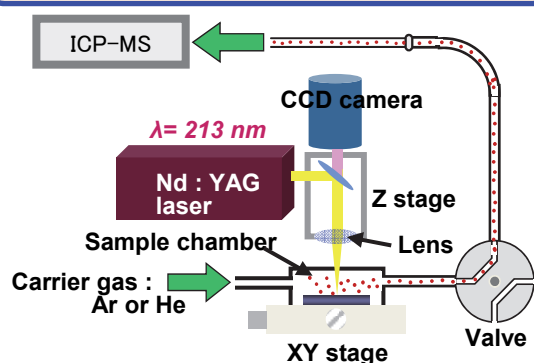


Fig.1 Diagram of LA-ICP-MS

Table1 Comparison of EPMA, TOF-SIMS and LA-ICP-MS

	EPMA	TOF-SIMS	LA-ICP-MS
Analytical elements	B~U	H~Compounds	Li~U
Excitation method	Electron beam	Ion	Laser beam(213nm)/ICP
Probe diameter	1μm	0.2μm	4~100μm
Analysis depth	~1μm	0.001~0.002μm	~50μm
Sensitivity	500ppm (Fe in silicon)	10ppm (Fe in silicon)	0.Xppm (Fe in silicon)

Characteristics of LA-ICP-MS

- Elemental imaging with ppm-level of metal
- Applicable to wide area (1cm × 1cm)

Metal diffusion analysis to the encapsulant in the photovoltaic module

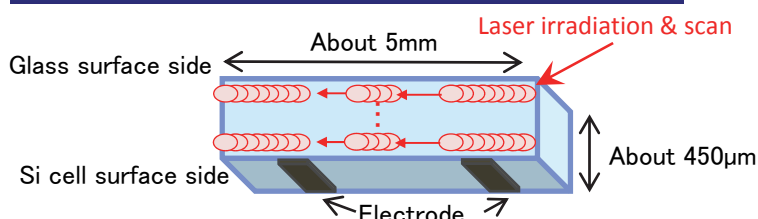


Fig.2 Cross section of the encapsulant for LA-ICP-MS

Na, Pb, Ag as the constituents of glass and electrode were detected with diffusion into the encapsulant of the product exposed for three years.

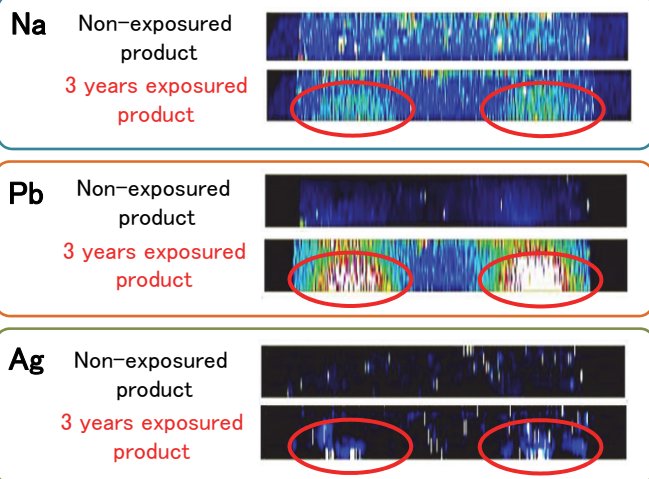


Fig.3 Imaging analyses of the PV encapsulant

Metal distribution analyses of the section of mouse heart

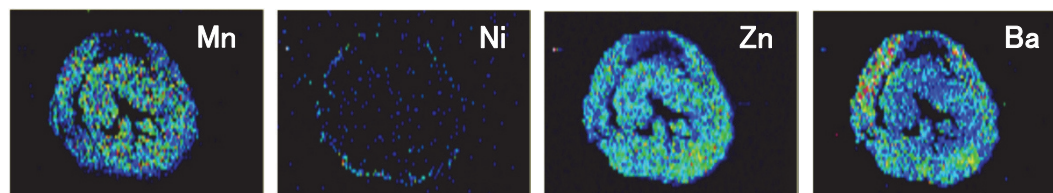
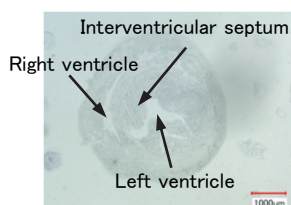


Fig.4 Elemental images of the section of mouse heart

*The samples were provided by Prof. Hiraoka of Rakuwakai Otowa Hospital.

Each element has a different distribution in the section.