

TOF-SIMS Imaging of Mouse Cerebellar Tissue

Mass spectrometry (MS) imaging has attracted interest as a method of directly visualizing the substances present in tissue. Recent years has seen increasing use of investigations based on MALDI-TOF-MS and TOF-SIMS. Here, we present examples of MS imaging of tissue sections using TOF-SIMS, which is inferior to MALDI-TOF-MS in terms of sensitivity in the high-mass range but achieves superior spatial resolution.

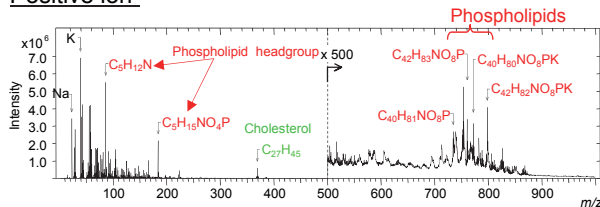
Pretreatment

Tissue samples taken from live mice
↓
Immersed in cold alcohol
↓
Prepared with a cryo-microtome and mounted on Si wafers
↓
Vacuum dried

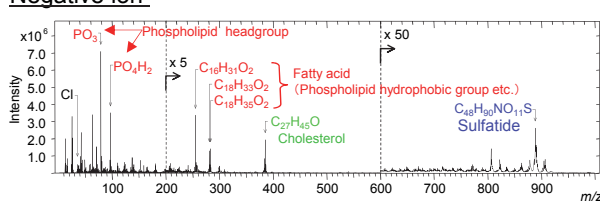
TOF-SIMS measurement

Mass spectra (detected substances)

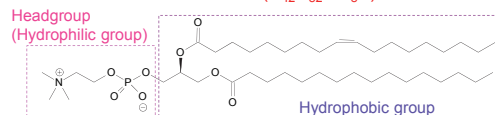
Positive ion



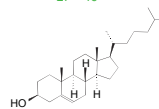
Negative ion



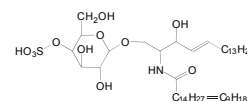
◆ **Phospholipid**
1-palmitoyl-2-oleoyl-sn-glycero-phosphocholine : POPC
($C_{42}H_{82}NO_8P$)



◆ **Cholesterol**
($C_{27}H_{46}O$)



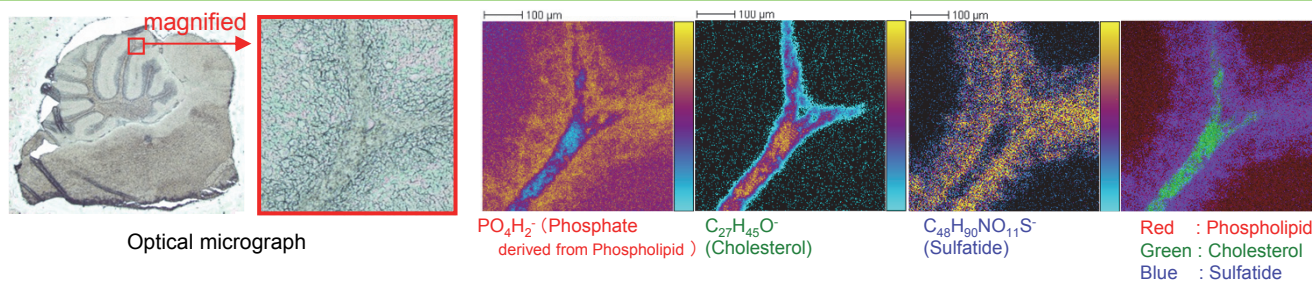
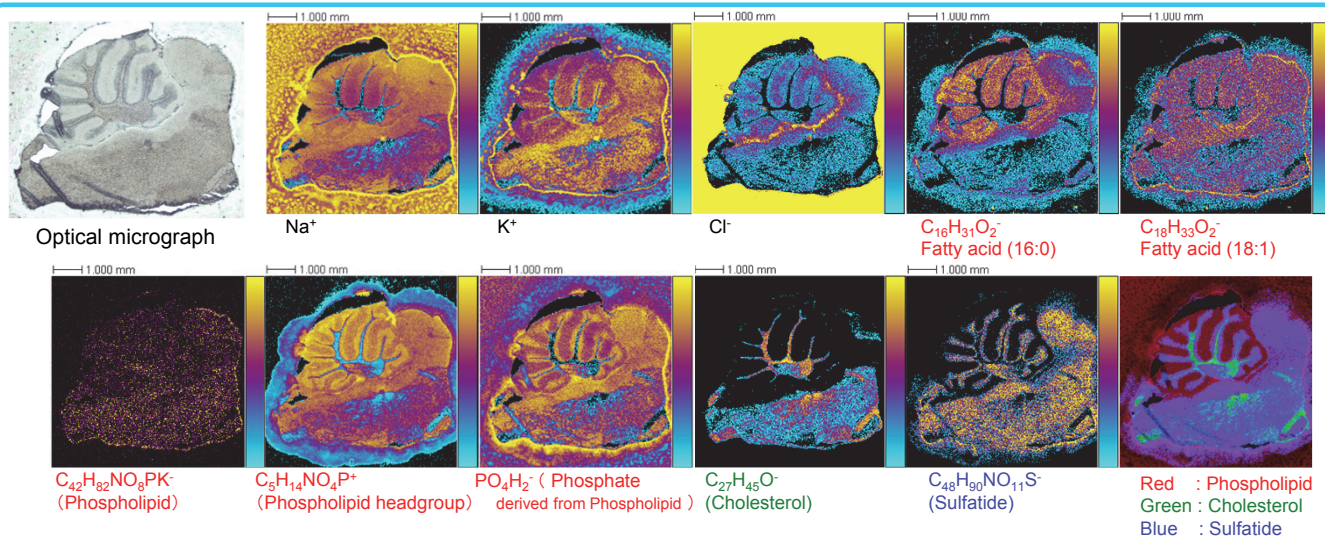
◆ **Sulfate** ($C_{48}H_{91}NO_{11}S$)



Phospholipids and cholesterol, which are among the basic constituent substances of biological membranes, and sulfate, which is the main lipid in the myelin sheath of the nerve fibers, were characteristically detected.

* The tissue samples were kindly provided by Associate Professor Jiro Matsuo of Quantum Science and Engineering Center, Kyoto University.

TOF-SIMS Imaging



Characteristic distributions were observed in phospholipids, sulfate, and cholesterol apart from Na, K, Cl, and other inorganic elements.

TOF-SIMS not only allows highly sensitive detection of metallic elements and halogens, but also enables clear observation of the distribution of lipids and other substances. Providing superior spatial resolution, it facilitates the observation of microscopic domains down to a range of several tens of micrometers.