DIUTHAME®

APPLICATION NOTE

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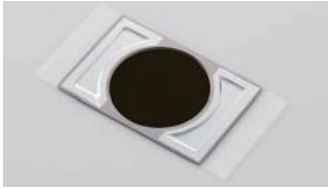
High spatial resolution(5 µm) DIUTHAME-MSI with simple pretreatment

DIUTHAME is an ionization-assisted substrate for MALDI with fine through holes of about 200 nm in diameter. This paper reports the experimental result of high spatial resolution mass spectrometry imaging (MSI), which is one of the features of DIUTHAME. The MS image of mouse brain sections were acquired with DIUTHAME and MALDI to compare the spatial resolution. By using DIUTHAME, succeeded in simplifying the preprocessing and obtaining MS image with 5 µm spatial resolution, which is equivalent to MALDI.



▲ A13331-18-1
(Conventional model)

Measurement conditions

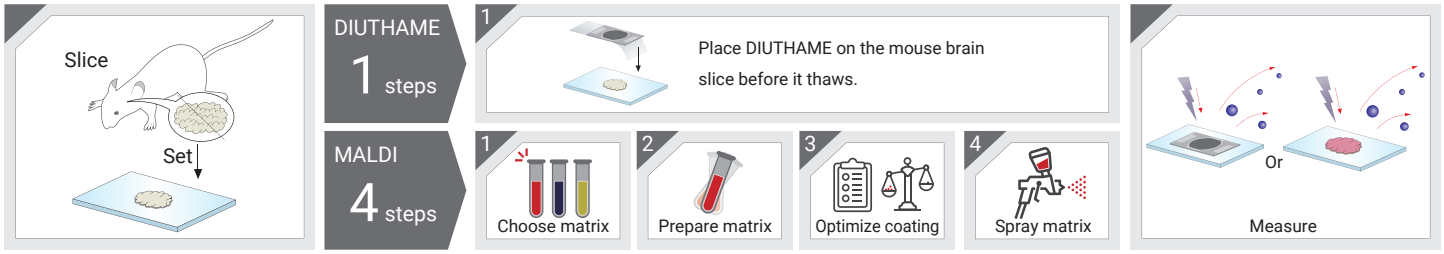
Measurement mode: laser pitch 5 µm, Positive ion mode, Orbitrap-MS and AP-SMALDI5 AF ion source (TransMIT GmbH, Giessen, Germany)

Sample: mouse brain slice, 50 µm thick*1

＊1: The recommended sample thickness for current products is 30 µm (as of 2021/11).

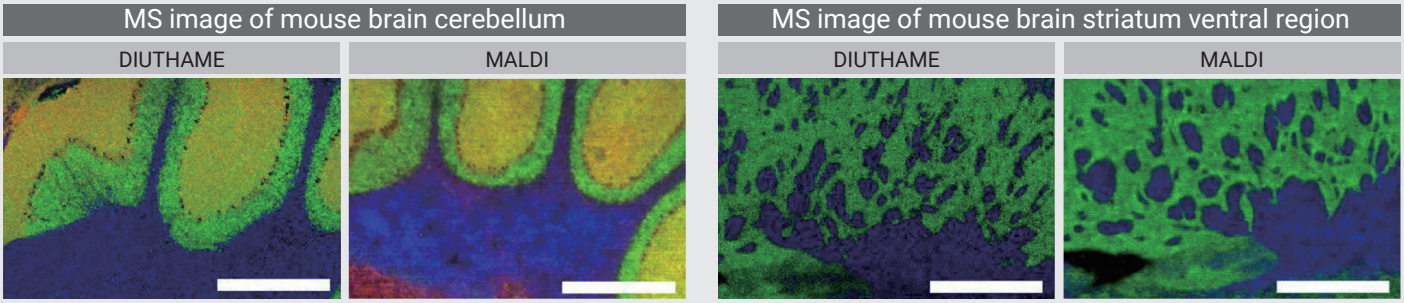
Method

One of the features to use DIUTHAME is that it simplifies the pretreatment compared to MALDI. Thin tissue sections from fresh-frozen tissue were prepared using a cryostat at −20 ℃. The prepared section is placed on a glass slide and the effective area of the DIUTHAME is placed on top of it. The sample is warmed up by putting a finger under the glass slide, and the sample thaws, causing the tissue to adhere to the membrane and the components to rise to the laser irradiation surface by capillary action.



Results

Achieved spatial resolution of 5 µm by DIUTHAME equivalent to MALDI



■ *m/z* 769.5620 [SM d36:1 + K]⁺
■ *m/z* 772.5253 [PC 32:0 + K]⁺
■ *m/z* 838.6086 [PC O-38:2 + K]⁺

Pixel size: 5 µm
Image size: 300 × 250 pixels
Laser focal diameter: 5 µm
Mass range: *m/z* 600–1000

Thickness of tissue sections: DIUTHAME 50 µm
MALDI 20 µm
Scale bars: 500 µm

Note: Measurement were performed in collaboration with the Institute of Inorganic and Analytical Chemistry, Justus Liebig University, 35392 Giessen, Germany

Reference: Max A. Müller, Dhaka R. Bhandari and Bernhard Spengler. Matrix-Free High-Resolution Atmospheric-Pressure SALDI Mass Spectrometry Imaging of Biological Samples Using Nanostructured DIUTHAME Membranes. Metabolites 2021, 11, 624.
Link: https://doi.org/10.3390/metabo11090624

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