1. Introduction

We have developed DIUTHAME (Desorption Ionization Using Through Hole Alumina MEmbrane) as an alternative to matrices. Ionization process using DIUTHAME and a comparison of the features with MALDI are shown in Fig.1 and Table 1.

Table 1: a comparison of the features with MALDI

<table>
<thead>
<tr>
<th>Item</th>
<th>DIUTHAME</th>
<th>MALDI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Background noise</td>
<td>None</td>
<td>Matrix noise appears</td>
</tr>
<tr>
<td>Ease of handling</td>
<td>Easy</td>
<td>Expertise is required</td>
</tr>
<tr>
<td>Reproducibility</td>
<td>High</td>
<td>Not so high</td>
</tr>
<tr>
<td>Spatial resolution</td>
<td>High</td>
<td>Not so high</td>
</tr>
<tr>
<td>Ionization of large molecules</td>
<td>Possible (spotty or spots)</td>
<td>Possible</td>
</tr>
</tbody>
</table>

In MALDI imaging MS, it’s recommended to slice a sample section in less than 10 micrometers thickness. However, some samples are difficult to cut very thinly. For example, raw strawberry which possesses high moisture content is difficult to be sliced into a thin section especially the sample becomes larger (referring to Table 2). This study aims to examine imaging MS using DIUTHAME with a blotting method which doesn’t require thin sectioning.

2. Methods

To conduct imaging MS, a raw strawberry was cut in half with knife under the room temperature. Then DIUTHAME chip was put on the cut surface and the contained materials on the strawberry were blotted. The DIUTHAME chip that was carefully removed from the strawberry, was then directly attached on MTP TLC Adapter (BigSlides for MALDI, Bruker). Imaging MS was taken by ultrafleXtreme (Bruker) MALDI time-of-flight mass spectrometer. Ion maps of various molecules were created by flexImaging software (Bruker).

3-1. Results: positive/negative mode

From the results of imaging MS of blotting onto DIUTHAME chip, the distribution of:
- choline was around pith tissue.
- hexose was mainly observed in cortical tissue and pith tissue in the positive mode and observed all over the strawberry section in the negative mode.
- citric acid was observed in the skin in the positive mode and observed in the tip side and cortical tissue in the negative mode.
- pelargonidin and m/z 301 attributable to quercetin and/or ellagic acid were located in the skin of a strawberry.
- sucrose was predominantly observed in the tip side of cortical tissue and vascular bundle.
- mali acid was similar to that of citric acid in the negative mode. This characteristic pattern was presumably formed by the reticulated juice after drying.

3-2. Results: effect of cutting direction

From the results of imaging MS, there is no effect of the direction to cut the raw strawberry with a knife.

3-3. Results: effect of cutting direction

4. Conclusion

- Imaging MS results of blotting onto DIUTHAME chip were consistent with MALDI imaging MS using frozen section.
- We suggest that the blotting method using DIUTHAME chip is very easy and effective for imaging MS of those which thin sectioning is difficult for.

References


For inquiries about DIUTHAME, Visit at Booth #110