〈教育セミナー〉

第48回教育セミナー（2023）・「皮膚を見る・観る・診る〜最新の可視化技術レビュー〜」

有効成分の局在を見る・観る〜イメージング質量分析〜

平　修*

Imaging Mass Spectrometry for Cosmetic Science

Shu TAIRA*

Abstract

　　In this review, visualization method using mass spectrometry (MS) is introduced. As second-generation MS, two-dimensional MS analysis of biomedical tissues by means of what is called imaging mass spectrometry (IMS) has begun to be used to analyze analyte distribution that MS spectra reconstructed as ion images to reveals the target molecule's distribution in the absence of specific markers such as antibodies and fluorescent dyes. It is a common concern that MALDI-based IMS is hard to image for the low molecular target because signals of organic matrices are detected at low molecular range by self-ionization. In addition, it is hard to acquire high-resolution images (<20 μm) due to the size of the matrix crystal. In the MALDI method, the co-crystals formed by the organic matrix uniformly applied on the section surface are ionized by a laser. Therefore, even if sections with good morphology are obtained, spatial resolution below the minimum size of the crystal (about 20–100 μm in diameter) is generally not possible. It is necessary to increase the spatial resolution of imaging to a level where differences in distribution at the level of microscopic plant tissues and cells can be detected. Thus, we should develop a new assisting ionization reagent and improve instrumental specifications. Recently, we have also developed nano-material-based technique called Nano-Particle Assisted Laser Desorption/Ionization (Nano-PALDI) MS has been used to ionize both small and large molecules without background signal in the low mass region. Nano-PALDI IMS can also acquire high-resolution images due to no effect of crystallization. In this time, as example of IMS data for not only health care science also skin science is introduced.

Key words: imaging, visualization, health care, skin, nanotechnology.