

Observation of Bioaccumulated Cesium Distribution in Marine Fish by using Imaging Mass Spectrometry

JUN AOKI^{1*}, MICHISATO TOYODA²

¹Osaka University, Toyonaka 460-0043, Japan

(*correspondence: ajunmail@mass.phys.sci.osaka-u.ac.jp)

²Osaka University, Toyonaka 460-0043, Japan

(toyodam@mass.phys.sci.osaka-u.ac.jp)

Introduction

In Japan, the release of radioactive substances to the ocean is concerned since the accident of nuclear power plant in 2011. Such radioactive substances flowed out to the ocean cause bioaccumulation in marine biological organisms. The mechanisms of biological absorption and accumulation of toxic substances are important and consequently have been extensively studied. Recently, imaging mass spectrometer with matrix-assisted laser desorption/ionization (MALDI-IMS) is intensively used for biomolecular analysis. However, conventional MALDI-IMS has disadvantages of limited spatial resolution and long measurement time. We have developed new projection-type imaging mass spectrometer to resolve these problem [1], and applied this instrument to observe the distribution of accumulated metal cations in fish.

Method and Results

Our newly developed projection-type imaging mass spectrometer consists of an ion source equipped with a laser irradiation system with an optical fiber beam homogenizer, electrostatic lens system for focusing ion trajectory as distribution image, and time and position sensitive detector for observing distribution of each molecular. Using this instrument, we observed a sagittal section of small marine fish (*eviota bifasciata*) bred in water contained Cesium with a field of view of 16.5 mm × 4.5 mm with a spatial resolution of 2.0 μm. From the observation results, we confirmed localized distributions of Cesium and other molecular such as Sodium and Potassium.

[1] J. Aoki, S. Ikeda, M. Toyoda (2014) J. Phys. Soc. Jpn. **83** (2), 023001.