Isotope analysis of aerosol using secondary ion mass spectrometry
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Introduction
This study focused on radio isotopes on aerosol which was exposed by the accidents of Fukushima-daiichi nuclear power plants. Radio isotopes are carried by winds within gas phase or absorbed on aerosol. When we discussed about the distribution of radio isotopes in the environments, the size of aerosol and the nuclides of radio isotopes have important factors to investigate the areas polluted by radio isotopes and internal contamination in our bodies. In this study, aerosol was size-filtered by cascade impactor and mass-analyzed by secondary ion mass spectrometry (SIMS).

Experimental
Aerosols were sampled by aerosol sampler MCAS-03 (Murata Inc.) which can filtered over 10 μm, within 2.5-10 μm and under 2.5 μm on aero dynamic diameters. The sampling locations were Noda Chiba, Katsuo Fukushima and Aihara Kanagawa. In some locations the aerosol sampler was supplied electric power by AC backup system; MBS-300S-TR1 (Miyachi works).

The sampled aerosols with sample plate were introduced to Dynamic-SIMS system (IMS-4f; AMETEK, Inc.) and supplied 4.5 kV energy. Primary beam conditions are oxygen dimer plus, 10 kV acceleration energy and 30 nA beam current. Secondary ions generated by sputtering process are energy separated and mass separated in the mass spectrometer. Mass spectrum is obtained under the mentioned conditions.

Results
These figures are represents typical aerosol mass spectrums. Mass spectrum of over 10 μm sized aerosols has split peaks. The split peaks (M/Z = 139, 141) can be originated to main fission products on nuclear reactions. Mass spectrum of under 2.5 μm sized aerosols has strong peak in M/Z = 131. The peak should have its origin in radio iodine which has already beta decayed.

Fig. Mass spectrums on size-filtered aerosols (left: over 10 μm right: under 2.5 μm)