Elemental composition of jet lubricating oil and fuel, and particles (particle size 10 nm—10 μm) collected near the Narita International Airport runway

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Abstract

In order to shed light on elemental composition of ultrafine particles (UFP) form aircrafts, we analyzed jet lubricating oil, fuel, and particles collected near the Narita International Airport runway using in-air PIXE and conventional PIXE. Our results suggest that:

— From jet lubricating oil and fuel, three elements of P, S and Fe were determined. In the jet lubricating oil, P was high concentration. The three elements values in the fuel were below the quantification limit.

— From particle samples collected durig the aircraft landing and arrival time zone, we have found that 26 elements (Na, Mg, Al, Si, P, S, Cl, K, Ca, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Ga, As, Se, Br, Rb, Sr, Hg and Pb) were identified. In the background sample, 25 elements except Rb were determined.

— The particle size distribution of the element per particle mass, three types ((1) type with large peak on the coarse particle side, (2) type with elements detection in UFP in addition to having a large peak in the coarse particle side, (3) type with peaks in UFP, fine particles and coarse particles) were observed. In addition, there were also types of particle size distribution with high concentration in UFP and fine particles.