



Characterization study of cesium concentrated particles in the soils near the Fukushima Daiichi nuclear power plant

Yukihiko Satou (1), Keisuke Sueki (1), Kimikazu Sasa (1), Kouji Adachi (2), and Yasuhito Igarashi (2)

(1) University of Tsukuba, Tsukuba, Ibaraki, Japan (yukihiko@ied.tsukuba.ac.jp), (2) Meteorological Research Institute, Tsukuba, Ibaraki, Japan

Radionuclides from the Fukushima Dai-ichi Nuclear Power Plant (FDNPP) accident contaminated a vast area. Two types of contamination, spread and spot types, were observed in soils with autoradiography using an imaging plate. Other samples such as dust filters, vegetation, X-ray films, and so on, also indicate the spot type contamination in the early stage of the FDNPP accident. The source of spot type contamination is well known as hot particles at the Chernobyl Nuclear Power Plant (ChNPP) accident in 1986. Hot particles were divided into two groups, fuel hot particles and fission product particles, and they were emitted directly from reactor core with phreatic explosion and fire. In contrast, the official reports of the FDNPP accident did not conform to core explosion. In addition, the emitted total amount of Uranium was very few (Yamamoto et al., 2014). Thus, the spot type contaminations were not identified as the same of hot particles yet. Therefore, the present study aimed to pick up and identify the spot contaminations in soils.

Surface soil samples were collected at 20 km northwest from the FDNPP in June 2013. Soils were spread in plastic bags for autoradiography with imaging plate analysis. Then, the soil particles were collected on a sticky carbon tape and analyzed by SEM-EDS to detect radioactive particles. Finally, particles were confirmed to contain photo peaks in the γ -spectrum by a germanium semiconductor detector.

Four radioactive particles were isolated from the soil samples in the present study. Detected γ -ray emission radionuclides were only Cs-134 and Cs-137. The X-ray spectra on the SEM-EDS of all particles showed a Cs peak as well as O, Fe, Zn, and Rb peaks, and these elements were distributed uniformly within the particles. In addition, uniform distribution of Si was also shown. Moreover, U was detected from one of the particles, but U concentration was very low and existed locally in the particle. These characters are very similar to previous studies reported particles isolated from air dust filters collected in Tsukuba, Ibaraki, 170 km south from the FDNPP (Adachi et al., 2013, Abe et al., 2014) but are different from former reported hot particles in the ChNPP accident.

References

- Yamamoto, M. et al., *J. Environ. Radioact.* 2014, 132, 31-46.
Adachi, K. et al., *Sci. Rep.* 2013, 3, 2554.
Abe, Y. et al., *Anal. Chem.* 2014, 86, 8521-8525.