

Development of the radio-aerosol generation system using spray drying method

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A large amount of radioactivity was discharged in the FDNPP accident. The radionuclide was transported through the atmosphere in a gas and aerosol forms and deposited to the ground and vegetation. The aerosol consisting radionuclides deposited to the vegetation mainly in dry deposition mechanism. After the deposition, the foliar uptake could happen and the radionuclide likes cesium would be absorbed into the vegetation. The foliar uptake process has higher absorption speed than the root uptake process. The radiocesium deposition through the foliar uptake has great influence when we evaluate the amount of radioactivity deposition to the environment.

There are some preceding studies for radionuclide foliar uptake with attaching stable element solution on the leaf. Changing the vegetation species, time of cleansing after the deposition and chemical constitution of solution, the foliar uptake process has understood gradually. However, these experiments using solution wouldn't reprise the dry deposition process. Madoz-Escande et al. generated cesium oxidation aerosols and studied the foliar deposition process [1]. In the FDNPP, radiocesium was transported in sulfate aerosol form [2], so the data of oxidation aerosols is not suit for evaluation the deposition in this accident. For evaluation of deposition amount of radiocesium to vegetation, an experiment system simulated the accident condition is demand

The aim of our research is observing the behavior of dry deposition and foliar uptake of radiocesium in sulfate aerosols. We need to generate radio-aerosol artificially in a controllable environment and attach aerosols on the leaf directly. A radio-aerosol generation system was developed using spray drying method. Solution contained radiocesium was send to a nozzle by a syringe pump and spraying by a high speed air flow. The spray was generated in a relatively high temperature chamber and micro-droplet was drying quickly. The micro size solid aerosols consisting radiocesium were generated. In our poster, we explain the chamber condition, the shape of spray, aerosol physical property and yield.

[1]C.Madoz-Escande, et al., Journal of Environmental Radioactivity, 73 pp49-71, (2004)

[2] N. Kaneyasu, et al., Environmental Science & Technology, 2012, 46 (11), pp 5720-5726

Keywords: radio-aerosol, cesium, foliar uptake, spray drying method