



# Fukushima: Highly Radioactive Cesium-Bearing Microparticles Released into Japan's Natural Environment. Impacts on Human Health

Par [Noriko Yamaguchi](#), [Masanori Mitome](#), [Akiyama-Hasegawa Kotone](#), [Maki Asano](#), [Kouji Adachi](#), et [Toshihiro Kogure](#)

Mondialisation.ca, 01 mars 2016  
[Nature](#) 3 février 2016

Région : [Asia](#)

Thème: [Environment](#), [Science and Medicine](#)

Analyses: [Nuclear War](#)

## Abstract

*Microparticles containing substantial amounts of radiocesium collected from the ground in Fukushima were investigated mainly by transmission electron microscopy (TEM) and X-ray microanalysis with scanning TEM (STEM). Particles of around 2 μm in diameter are basically silicate glass containing Fe and Zn as transition metals, Cs, Rb and K as alkali ions, and Sn as substantial elements. These elements are homogeneously distributed in the glass except Cs which has a concentration gradient, increasing from center to surface. Nano-sized crystallites such as copper- zinc- and molybdenum sulfide, and silver telluride were found inside the microparticles, which probably resulted from the segregation of the silicate and sulfide (telluride) during molten-stage. An alkali-depleted layer of ca. 0.2 μm thick exists at the outer side of the particle collected from cedar leaves 8 months after the nuclear accident, suggesting gradual leaching of radiocesium from the microparticles in the natural environment.*

## Introduction

Although almost five years have passed since the accident of Fukushima Daiichi Nuclear Power Plant (FDNPP), radioactive contamination in the surrounding area is still a serious problem in Japan. The largest radionuclide deposition event occurred on March 15–16 and the second largest on 21–23, 2011. Wet deposition was a major source of radiocesium contamination of terrestrial environment<sup>1</sup>, while contribution of dry deposition was larger near the FDNPP<sup>2</sup>. In order to understand and predict the fate of radioactive materials contaminating the terrestrial environment, it is important to clarify the physicochemical properties of the deposited materials. From previous cases of radionuclide release, it is known that the chemical species of released radiocesium is monovalent cation (Cs<sup>+</sup>) which is soluble<sup>3</sup>. Deposition of radiocesium as insoluble particles has also been pointed out. Autoradiography analyses using imaging plate (IP) showed spots of particulate materials on plant tissues collected from Fukushima<sup>4,5,6</sup>. On the aerosol filter collected from March 14–15, 2011 in Tsukuba, 170 km south-southwest of FDNPP, Adachi *et al.*<sup>7</sup> discovered spherical

particulate radiocesium of 2.0–2.6 µm in diameter, with particles insoluble in water having a glass-like structure<sup>8</sup>. These microparticles contain several fission products of U-235 other than radiocesium, and Fe and Zn which are also used in nuclear reactors<sup>8</sup>. Hence, they were considered to be released directly from nuclear reactors.

Kaneyasu *et al.*<sup>9</sup> suggested that vaporized radiocesium was transported with sulfate aerosol in the air, dissolved to cloud droplets and fell as rain. On the aerosol filter collected on March 20–21, 2011, rainy days in Tsukuba, the majority of radiocesium was in water-soluble form<sup>7</sup>. Such water-soluble radiocesium that reached the ground surface as a solute was fixed to soils, especially to clay minerals<sup>10</sup>. In the terrestrial environment, the majority of radiocesium is present in solid form regardless of the initial form of deposition. However, compared to clay minerals originally contaminated by soluble radiocesium in soil, the solid radiocesium, which was initially deposited as radioactive microparticles, had stronger radioactivity. Although the contribution or percentage of such radioactive microparticles in the contamination level of Fukushima has not been evaluated, its influence on human health may be serious in terms of its intense radioactivity. Moreover, the structural detail of the microparticles may give insights into the state of the broken reactor and fuel debris.

In the present study, we investigated radioactive microparticles, similar to those reported by Adachi *et al.*<sup>7</sup>, but collected from the ground, by observing their internal structure with transmission electron microscopic (TEM) techniques.

(...)

[Read full article here](#)

La source originale de cet article est [Nature](#)

Copyright © [Noriko Yamaguchi](#), [Masanori Mitome](#), [Akiyama-Hasegawa Kotone](#), [Maki Asano](#), [Kouji Adachi](#), et [Toshihiro Kogure](#), [Nature](#), 2016

Articles Par : [Noriko Yamaguchi](#), [Masanori Mitome](#), [Akiyama-Hasegawa Kotone](#), [Maki Asano](#), [Kouji Adachi](#), et [Toshihiro Kogure](#)

**Avis de non-responsabilité** : Les opinions exprimées dans cet article n'engagent que le ou les auteurs. Le Centre de recherche sur la mondialisation se dégage de toute responsabilité concernant le contenu de cet article et ne sera pas tenu responsable pour des erreurs ou informations incorrectes ou inexactes.

Le Centre de recherche sur la mondialisation (CRM) accorde la permission de reproduire la version intégrale ou des extraits d'articles du site [Mondialisation.ca](#) sur des sites de médias alternatifs. La source de l'article, l'adresse url ainsi qu'un hyperlien vers l'article original du CRM doivent être indiqués. Une note de droit d'auteur (copyright) doit également être indiquée.

Pour publier des articles de [Mondialisation.ca](http://Mondialisation.ca) en format papier ou autre, y compris les sites Internet commerciaux, contactez: [media@globalresearch.ca](mailto:media@globalresearch.ca)

[Mondialisation.ca](http://Mondialisation.ca) contient du matériel protégé par le droit d'auteur, dont le détenteur n'a pas toujours autorisé l'utilisation. Nous mettons ce matériel à la disposition de nos lecteurs en vertu du principe "d'utilisation équitable", dans le but d'améliorer la compréhension des enjeux politiques, économiques et sociaux. Tout le matériel mis en ligne sur ce site est à but non lucratif. Il est mis à la disposition de tous ceux qui s'y intéressent dans le but de faire de la recherche ainsi qu'à des fins éducatives. Si vous désirez utiliser du matériel protégé par le droit d'auteur pour des raisons autres que "l'utilisation équitable", vous devez demander la permission au détenteur du droit d'auteur.

Contact média: [media@globalresearch.ca](mailto:media@globalresearch.ca)