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Mitsubishi Electric Corporation

Mitsubishi Electric Plant Engineering Corporation

Nagoya University

Japan Atomic Energy Agency

Radioactive Airborne Particulate Monitor Receives a 2026 R&D 100 Award

Enhancing Safety in Nuclear Facility Work Environments through the Rapid and Highly Accurate Identification of Radioactive Materials



Radioactive Airborne Particulate Monitor



TOKYO, October 8, 2026 – Mitsubishi Electric Corporation (Mitsubishi Electric), Mitsubishi Electric Plant Engineering Corporation (MPEC), Nagoya University, Tokai National Higher Education and Research System (Nagoya University), and the Japan Atomic Energy Agency (JAEA) announced today that the “Radioactive Airborne Particulate Monitor,” jointly developed by the four organizations, has received a 2026 R&D 100 Award, presented by R&D World in recognition of innovative technological developments.

The Radioactive Airborne Particulate Monitor can rapidly and accurately identify and measure radioactive materials in the air at nuclear facilities and other locations, thereby improving workplace safety. At facilities that handle radioactive materials, such as nuclear power plants, radioactive particulates (aerosols) may become airborne in the event of an accidental release of radioactive substances. To prevent workers from suffering serious internal radiation exposure, monitoring systems capable of strictly controlling the concentrations of artificial radioactive materials, including nuclear fuel materials, are required.

With conventional monitors, it has been difficult to accurately distinguish the proportion of alpha particles emitted by naturally occurring radioactive materials compared to those emitted by artificial nuclear fuel materials. Identifying nuclear fuel materials requires precise analysis at specialized facilities. The Radioactive Airborne Particulate Monitor implements an unfolding technique that estimates the energy distribution of

alpha particles and identifies the type of radioactive material without precise analysis. This technology has significantly improved the detection limit¹ and reduced measurement time, making it possible to immediately detect radioactivity concentrations by type of nuclear fuel material at the work site. The R&D 100 award recognizes this technology for enabling rapid responses to abnormal events. This technology is expected to contribute to improved safety not only at nuclear-related facilities, but also at a wide range of facilities that handle radioactive materials, from resource extraction and mining sites to medical facilities.

Features

- 1) Implementation of an “unfolding technology” that enables the separation of naturally occurring nuclides² from artificial nuclides, which was previously difficult to achieve***
- 2) Compared with conventional methods, this approach achieves a detection limit that is more than 100 times lower while reducing the measurement time to one-sixth or less***
- 3) Enabling immediate on-site quantification and making a significant contribution to ensuring worker safety in high-risk environments, including decommissioning operations at the Fukushima Daiichi Nuclear Power Station***

Roles and Tasks

Organization	Responsibilities	
Mitsubishi Electric	ATC ³	Development of an unfolding-based measurement algorithm and verification of its measurement performance
	MERL ⁴	Development of an algorithm to compensate for detection sensitivity
MPEC	System design and product development of radioactive airborne particulate monitors, including coordination of field demonstrations	
Nagoya University	Representative of the Eichi Project , Coordination of proof-of-concept activities	
JAEA	Assessment of measurement performance for nuclear fuel materials	

The principal investigator at Nagoya University is Professor Shunsuke Kurosawa of the Graduate School of Engineering (affiliated with Tohoku University at the time of the study).

Part of this study was conducted with the support of the Japan Atomic Energy Agency (JAEA) under the Nuclear Energy Science and Technology and Human Resource Development Project, Problem-Solving-Oriented Research Program for Decommissioning (JPJA18P18071964, JPJA22P22683602).

About the R&D 100 Awards

Since 1963, *R&D World* has sponsored the R&D 100 Awards to recognize the world’s 100 most outstanding commercial technologies each year. The prestigious awards, often referred to as the “Oscars of Innovation,” are nominated by industry professionals, university academics, researchers and other experts. Winners are selected as the most technically significant, original and useful technologies brought to market in the previous year. This year’s award ceremony will be held in the U.S. city of Scottsdale, Arizona on November 20.

1 The minimum amount of a target substance that can be detected in analysis or measurement.

2 A type of atomic nucleus or atom characterized by its atomic number, mass number, and energy state

3 Advanced Technology R&D Center

4 Mitsubishi Electric Research Laboratories

Customer Inquiries

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