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Background Rn-rejected Actinide in Air Spectroscopy

Rn-rejected alpha spectroscopy detects actinides with high efficiency while ignoring radon background.

Researchers at Purdue University have developed a new method to remove radon isotopes and their decay chain products and detect alpha-emitting actinides (plutonium and uranium isotopes) in air. Alpha-emitting actinides have negative health consequences; they are 1000-10,000 more harmful than radon gas, which is also radioactive. Current methods to detect alpha-emitting actinides in air suffer from low detection efficiency and lengthy detection times and can be overwhelmed by background radiation. The Purdue technology functions at a 10 times faster rate and with approximately 100% intrinsic alpha & neutron detection efficiency while remaining 100% blind to background (gamma-beta and radon-related) radiation.

Technology Validation: For each of the four plutonium-239 : plutonium-240 ratios tested, the method predicted the most likely ratio compositions. Also, the method accurately classified 90% of the mixtures tested in the experiments.

Related Publication: Hemesath, M., Boyle, N., Archambault, B., Lorier, T., DiPrete, D., Taleyarkhan, R. (2022). Actinide in Air (Rn-Progeny Rejected) Alpha Spectroscopy with Tensioned Metastable Fluid Detectors. Journal of Nuclear Engineering and Radiation Science, Vol. 8/022001-1-to-9, April 2022.

Advantages

- Efficient

- Accurate

Applications

- Continuous air monitors with Rn rejection

Technology ID

2022-TALE-69716

Category

Aerospace & Defense/Defense Electronics & Surveillance Technologies

Materials Science & Nanotechnology/Materials Testing & Characterization Tools

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View online

- Spectroscopic alpha-neutron detection in extreme (to 15,000 R/h) background gamma-beta radiation fields.

TRL: 2

Intellectual Property:

Provisional-Gov. Funding, 2022-01-20, United States

Utility-Gov. Funding, 2023-01-20, United States

Keywords: Actinide Detection, Chemistry and Chemical Analysis, Radon, Spectroscopy