

## Background Rn-rejected Actinide in Air Spectroscopy

**Track Code:** 2022-TALE-69716

**Categories:**

- Chemistry and Chemical Analysis

**Keywords:**

- Actinide Detection
- Chemistry and Chemical Analysis
- Radon

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

**People:**

- Taleyarkhan, Rusi P (Project leader)

**Intellectual Property:**

**Application Date:** January 20, 2022

**Type:** Provisional-Gov. Funding

**Country of Filing:** United States

**Patent Number:** (None)

**Issue Date:** (None)

**Contact OTC:**

Purdue Office of Technology Commercialization

The Convergence Center

101 Foundry Drive, Suite 2500

West Lafayette, IN 47906

Phone: (765) 588-3475

Fax: (765) 463-3486

Email: [otcip@prf.org](mailto:otcip@prf.org)