

Hybrid Mass-alpha Spectrometry for High Resolution Spectroscopy

Hybrid mass-alpha spectrometry rapidly resolves alpha isotopes with high sensitivity and background rejection.

Researchers at Purdue University have developed a new spectroscopic method for detecting trace amounts of alpha emitting radionuclides. Traditionally, detecting closely-spaced energetic alpha radiation-emitting isotopes at trace concentrations needing mass spectrometry has taken weeks. On the other hand, the Purdue hybrid technology rapidly and spectroscopically detects alpha radiation with ~100% sensitivity, less than 10 keV resolution, and an accuracy within 5% when evaluated against standards. This technology also maintains its sensitivity to weak alpha radiation in an intense field of gamma-beta radiation; the same apparatus also can be deployed for high-fidelity neutron spectroscopy.

Technology Validation: The Purdue researchers identified the ratio between two plutonium isotopes ranging from 1:0 to 0:1 to an accuracy within 12% and under 10 keV energy resolution.

Advantages

- accurate
- high-energy resolution and sensitivity
- alpha and neutron radiation detection
- 100% background gamma-beta rejection
- rapid (1 hr)

Applications

Technology ID

2022-TALE-69717

Category

Aerospace & National
Security/Defense, Electronics, &
Surveillance Technologies
Automotive & Mobility
Tech/Micromobility & Smart
Urban Infrastructure
Biotechnology & Life
Sciences/Analytical & Diagnostic
Instrumentation

Authors

Rusi P Taleyarkhan

Further information

Aaron Taggart
adtaggart@prf.org

View online



- spectroscopic detection of alpha and neutron radiation

TRL: 2

Intellectual Property:

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

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

Keywords: Alpha radiation, Background rejection, Chemistry and Chemical Analysis, Energy-Safeguards-Security, High sensitivity, High-resolution, Neutron radiation, Radiochemistry, Spectrometry