

KEEP SPECTRA PRECISE WITHOUT BREAKING THE BANK,
OR THE DETECTOR

CHOOSE MEDIUM RESOLUTION



Make quick, informed decisions with rapid and reliable spectral
data delivered in the field with Kromek's D5 RIID

Reliable spectroscopic data in the field

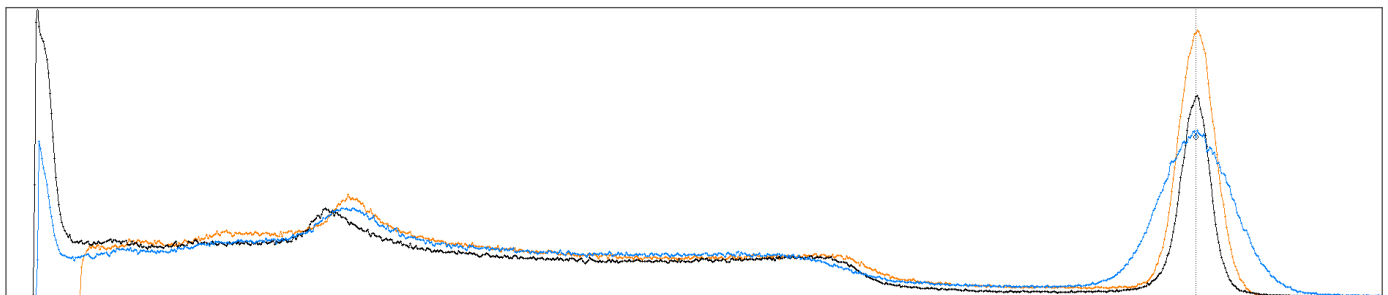
To ensure the appropriate, context-specific action is taken in the face of a radiological or nuclear incident, you need reliable and rapid spectral data.

Enter the D5 RIID: a CLLBC-based, ruggedised, medium resolution gamma and neutron detection and identification device.

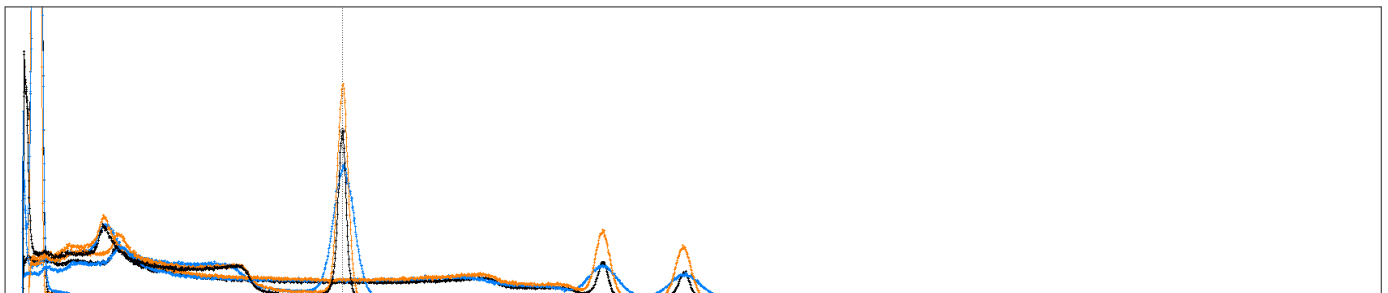


Why resolution matters

Resolution refers to the width of a single energy peak at a specific energy on a spectral data plot. It is measured either in absolute keV or as a percentage of the energy at that specific point on the graph. The higher the resolution, the more distinct and clearly separated the energy peaks. As a result, the radioisotopes present in the source can be identified with precision. This is especially significant when analysing complex mixtures, where overlap between radioisotopes with similar signature peaks is likely.



Spectra for the source Cs-137 produced by the low resolution D3S ID (blue), medium resolution D5 RIID (orange) and the high resolution GR1-A (black).



Spectra for the sources Am-241, Co-60 and Cs-137 produced by the low resolution D3S ID (blue), medium resolution D5 RIID (orange) and the high resolution GR1 (black).

When CZT comes into play

The semiconductor CZT (Cadmium Zinc Telluride) with its high resolution allows for more accurate spectral data and analysis. Unlike Germanium (HPGe) detectors, CZT does not require cryogenic cooling before use. Combining this with direct conversion, CZT-based detectors are able to produce distinct spectral peaks for the accurate identification of the mixture of isotopes present in a source.

Due to their high resolution and small form factor, CZT-based detectors are optimal for incorporation into linear arrays, mounting onto drones or robots and integrating into custom detection systems. This is particularly relevant for use in Civil Nuclear applications, such as contamination monitoring in the environment, at Power Plants and analysis in the lab for students and researchers alike.

However, with respect to use in Security and Defence industries and applications, CZT-based solutions do not yet have the desired sensitivity for illicit source detection, and are often quite expensive.

As the world's only commercial manufacturer of CZT, Kromek is hoping to change this.

Accurate secondary adjudications

The <4% resolution of this detector allows for a more definitive confirmation of the radioisotopes present. Highly defined spectral peaks gives way to increased confidence in remote, secondary adjudications, enabling more informed and timely decisions.

The medium resolution of the D5 RIID enables an accurate adjudication of the origin of the radioisotope(s) detected, further informing courses of action with high quality adjudication spectra. For instance, based on enrichment levels, it can be deciphered whether Uranium or Plutonium contaminants are from naturally occurring sources, or otherwise.

Immediate action on the ground

Also due to the D5 RIID's medium resolution, along with its low false alarm rate and constant monitoring, those on the ground are also armed with rapid alerts and reliable spectral data to take immediate action. With its extensive detection and identification capabilities and reachback, no other specialised instrument is needed; run your operations effectively with no extra costs.

Identifying the most hidden sources

Radiological and nuclear incidents are often far from straightforward. Multiple radioisotopes with similar chemistries may all be released into the environment or atmosphere at one time following an accident at a power plant. Other radioisotopes, at border control for example, may be heavily masked; their presence hidden in spectral analysis by a less harmful radioisotope with similar peaks. For example, Plutonium can be easily masked by medical isotopes of Iodine due to their main energy peaks being very close together. Therefore, to a low resolution device, this would appear as a truly legal shipment of Iodine, with significant consequences.

Shielded sources are also more difficult to detect due to the use of lead-shielding, which reduces the detectable activity of the source.

In the face of all these challenges, the medium resolution of the D5 RIID ensures spectral peaks remain clearly defined. Even the most similar radioisotopes are accurately differentiated during spectral analysis. Remote decision-makers are consistently supplied with actionable intelligence to ensure the appropriate next steps are taken, even in the most complex and demanding situations.



Why not high resolution?

The most commonly used high resolution detector is High Purity Germanium (HPGe). Despite their ability to produce highly defined spectral peaks, HPGe detectors are physically fragile, making them unsuitable for monitoring in-field or identification on site at an incident. They're also bulky in design, which makes them unsuitable for use as a handheld device. Repairs are expensive, and specialist knowledge required for operation. For instance, before use, HPGe detectors must be cryogenically cooled and consume liquid nitrogen.

Whilst supplying users with a sufficient resolution for complex identification, the D5 RIID is optimal for use in the field. It's ruggedised build, ease of use and rapid loading speed allows individuals to pick up a D5 RIID and head straight to the site of an incident for precise, real-time in-field spectral analysis.

When low resolution takes the stage

In some instances, only the basic identification of radioisotopes is required, for instance, in initial responses to a radiological event. This calls for more cost-effective, low-resolution detectors. For example, on duty officers on the front line may require constant monitoring of an area, with reliable detection and immediate alerts to facilitate rapid action to protect the public, themselves and their team. CBRN specialists can then later perform a secondary adjudication with a higher resolution device to attain more detailed spectral data on the event, further informing next steps e.g. clean-ups based on the identity of the specific radioisotopes present.

Kromek's wearable D3M PRD supplies users with high performance detection with an ultra-low false alarm rate, but also with RIID quality spectral data. Over 100,000 spectral files can be extracted by CBRN specialists for secondary adjudication.



Discreet, wearable and lightweight, the D3S ID constantly scans for radioactive threats. Receiving alerts through Bluetooth via a paired phone or earpiece, the detector is imperceptible to the public or any suspect.





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