

## Hidden Analytical SIMS Supports Isotope Ratio Analysis in Enriched Medical Isotope Target Development

Depth-resolved SIMS analysis provides spatial insight into enriched solid targets for medical radioisotope production research.

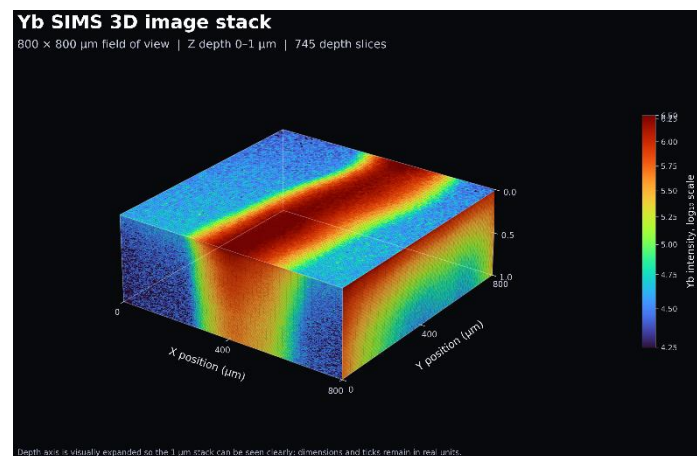
Hidden Analytical highlights the application of Secondary Ion Mass Spectrometry, SIMS, for isotope ratio analysis in enriched solid target materials used in medical radioisotope production research and development.

Many medical radioisotopes are produced by neutron irradiation of stable isotope targets. In these processes, the isotopic composition of the starting material can directly influence activation yield, radionuclidic purity and downstream radiochemical processing. Enriched targets are therefore used to maximise production of the required radionuclide while reducing unwanted activation products.

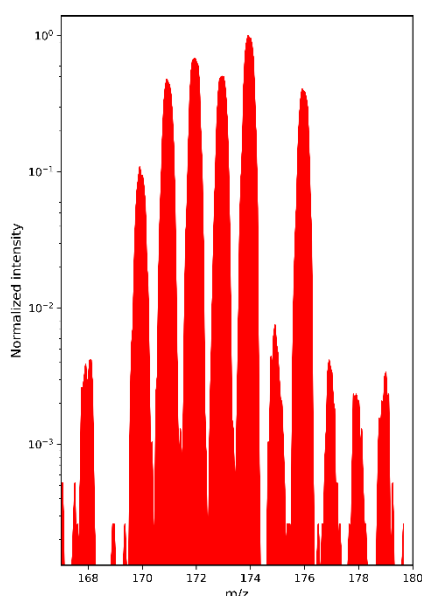
SIMS offers a valuable analytical route because it measures solid samples directly, with very small material consumption and without the need for full sample dissolution. This is particularly useful for enriched materials that are scarce, high value, difficult to dissolve or required for further process development.

A key advantage of SIMS is its ability to preserve spatial and depth information. While bulk isotope analysis provides an averaged composition, SIMS can show how isotope distribution varies across a surface, through a deposited layer or within a depth profile. This makes it especially relevant for thin deposits, collected enrichment products, laser enrichment studies, plasma or vapour deposition processes, and target quality assessment before irradiation.

*"Enriched isotope targets are often valuable, limited in quantity and highly application-specific," says Graham Cooke, Principal Scientist at Hidden Analytical. "SIMS provides a direct way to examine isotope distribution in the solid material itself, while retaining the spatial and depth information that can be lost in bulk measurements."*



↑ **Yb-174 SIMS 3D image stack:** Depth-resolved SIMS image of a 200 µm-wide line of Yb-174 deposited on a stainless-steel substrate. The measurement area is 800 × 800 µm, with a total analysed depth of 1 µm.



← **Yb isotope mass spectrum:** SIMS mass spectrum showing Yb isotopes normalised to the  $m/z$  174 peak. Approximately 1 ng of material was removed from the solid sample to make this measurement.

In the example data, SIMS was used to analyse a 200 µm-wide line of ytterbium-174 deposited on a stainless-steel substrate. The 3D image stack covers an 800 × 800 µm measurement area with a total analysed depth of 1 µm, visualising the Yb signal through the deposited feature. The accompanying mass spectrum shows the Yb isotopes normalised to the  $m/z$  174 peak, with approximately 1 ng of material removed from the solid sample during measurement.

For laboratories developing enriched solid targets, Hidden Analytical's [AutoSIMS](#) offers a compact and automated route to routine SIMS analysis. Rather than positioning SIMS only as a large, specialist-facility technique, AutoSIMS is designed as a self-contained platform for repetitive surface analysis, thin-film measurements, depth profiling and 3D characterisation. Its automated operation, spreadsheet-defined

parameters and small footprint make it well suited to repeatable measurements on deposited or scarce materials, including enriched isotope target layers.

For this application, AutoSIMS helps make isotope distribution, surface composition and depth-resolved assessment more accessible to laboratories that need meaningful SIMS data without the complexity typically associated with large, research-centre-scale SIMS instrumentation.

For deposited enrichment products, this type of depth-resolved measurement can help assess whether isotope composition remains stable through the collected layer or changes with process time. With appropriate standards, calibration and correction methods, SIMS can support isotope ratio comparison alongside surface composition analysis, contamination checks and investigation of localised variation, substrate mixing or interfacial effects.

This makes SIMS a strong complementary technique for enriched medical isotope target development, helping researchers assess whether the correct isotope has been enriched, whether the material is homogeneous, and whether unwanted isotopic or chemical contributions are present before irradiation.

Visit Hiden Analytical's [Medical Isotope Enrichment](#) blog to find out more, or [speak to the team](#) to discuss your application requirements.

### **About Hiden Analytical**

Hiden Analytical has more than 40 years of experience in the design, development and manufacture of quadrupole mass spectrometers for advanced research applications and specialist process monitoring. Based in the UK, Hiden Analytical supplies mass spectrometry solutions for gas analysis, catalysis, thermal analysis, electrochemistry, plasma diagnostics, residual gas analysis, surface science and related research fields.

### **Relevant Hiden Analytical links**

- [AutoSIMS](#)
- [Press Release](#)
- [Blog Article](#)
- [Send us a Message](#)

--- ends ---