

Isotope Research Materials Laboratory

Enriched Stable Isotope Processing



The Isotope Research Materials Laboratory (IRML) at ORNL provides enriched stable isotopes to the medical, industrial, national security, and scientific communities. The IRML team manages and distributes the Department of Energy stable isotope inventory consisting of more than 3,500 quality-controlled batches of 306 stable isotopes of approximately 79 elements. The batches are stored in chemically stable forms and are readily available for delivery. Ongoing research and development of solid and gaseous processing techniques enables the team to transform valuable enriched isotopes into chemical and physical forms that support cutting edge research.

Services

With an exceptional level of precision and expertise, the IRML team performs small-batch conversion and manufacturing of very reactive alkaline, alkaline earth, transition, and rare earth elements as isotopic materials to customer specifications. These services include:

- Conversion of inorganic chemicals
- Reduction and distillation of metals
- Casting and alloying by induction, arc, and resistance techniques
- High vacuum evaporation techniques
- Wire casting, rolling, and swaging processes
- Hot and cold rolling
- Pressing and sintering of metal and ceramic pellets
- Advanced materials characterization
- Vacuum hot pressing
- Isotopic gas synthesis and conversion
- Ion beam and plasma sputtering
- Precision low-kerf sectioning
- Air-sensitive processing with vacuum packaging
- Enriched isotopic gas handling and shipping
- Direct transfer of isotopic gases for dispensing

Applications

- Stable isotope precursors (for example, ytterbium-176) for nuclear reactor- and accelerator-produced radiopharmaceuticals
- Direct medical applications (for example, xenon-129 for pulmonary imaging)
- Target materials for nuclear physics and other scientific research (for example, ruthenium-96)
- Multiple isotopes vital to protecting the nation from physical threats

DETAILS



4 chemistry labs
and 7 materials labs



High-temperature
furnaces

Inert glovebox

Rolling mills

Reduction/distillation
systems

Evaporation systems:
resistance, e-beam,
induction

Vacuum hot press

Swager

SEM/EDS

PARR reactor systems

Diamond wire saw

Induction casting
machine

Reactive ion etching

Abrasive microblaster

Hydraulic presses

Mass spectrometers

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