

Enriched Stable Isotope Processing

Isotope Research Materials Laboratory



Mission

The Isotope Research Materials Laboratory (IRML) at Oak Ridge National Laboratory provides enriched stable isotopes to the medical, industrial, national security, and scientific communities. The IRML team manages and distributes the DOE 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 both chemical and physical forms that support cutting edge research. IRML products are produced in compliance with the ISO 9001:2015 standard.

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, ^{176}Yb) for nuclear reactor- and accelerator-produced radiopharmaceuticals
- Direct medical applications (for example, ^{129}Xe for pulmonary imaging)
- Target materials for nuclear physics and other scientific research (for example, ^{96}Ru)
- Multiple isotopes are vital to protecting the nation from physical threats

Specifications



4 Chemistry Labs



7 Materials Labs



High-temperature furnaces
Inert glove box
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



B. Alan Tatum
Stable Isotope
Portfolio Manager
865.574.4759