

Spanning the Periodic Table: An Overview of Stable Isotope Target Fabrication at ORNL

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Outline

- Group Overview
- Group Capabilities
- Technical Service Highlights

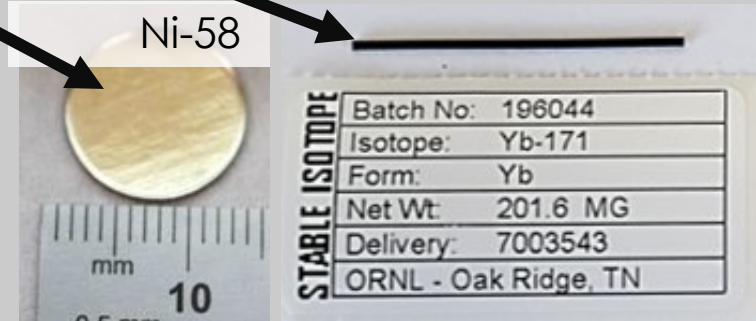
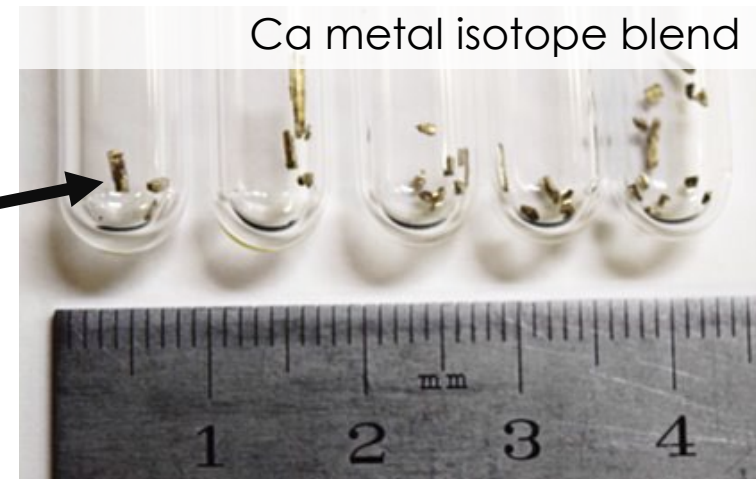
National Stable Isotope Repository

The United States Department of Energy (US DOE) Isotope Program's **National Stable Isotope Repository** at Oak Ridge National Laboratory is a DOE Office of Science capability that ensures a supply of crucial isotopically and chemically purified materials for:

- Cancer therapy
- Diagnostic imaging
- Security
- Scientific research



Our Technical Services enable science and conserve the DOE Stable Isotope Repository



Our specialty is our scientific abilities

- Transformations at very small scale
- We combine material, tools and skills
- Strive for zero loss

“ We do whatever it takes to transform enriched stable isotopes into the form the researchers need to make their experiments successful. ”

Varied needs require broad range of equipment and expertise

Products

- Powder (metal or compounds)
- Foil
- Disk
- Wire
- Pellets
- Bead
- Rod
- Gas



Equipment

- High-temperature furnaces
- Inert glove box
- Rolling mills
- Reduction/distillation systems
- Evaporation systems: resistance, e-beam, induction
- Presses: pellet, hydraulic, vacuum hot
- Swager
- Diamond wire saw
- Induction casting machine
- Reactive ion etching
- Abrasive microblaster

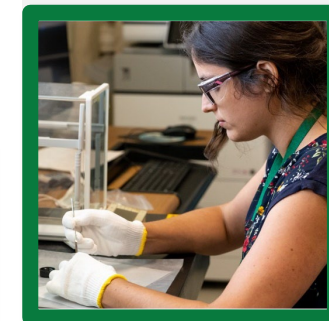
Analytical Tools

- SEM/EDS (Scanning Electron Microscope/ Energy Dispersive Spectroscopy)
- Mass Spectrometer with laser ablation capability
- Calibrated measurements
- Handheld XRF (X-Ray Fluorescence) Spectrometer
- Light microscope



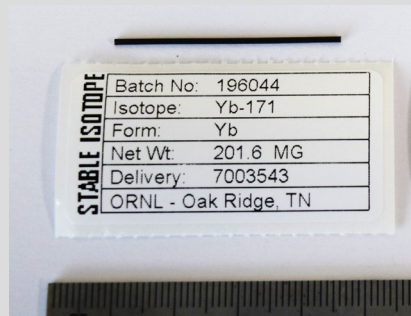
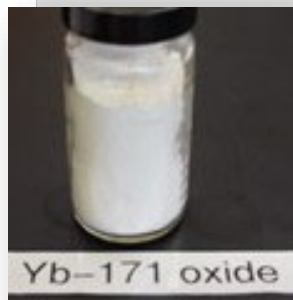
ORNL Campus

- Certified Analytical Testing
- Clean Room access
- Fabrication shop
- Secure location
- Materials experts
- Analysis experts
- Chemistry experts



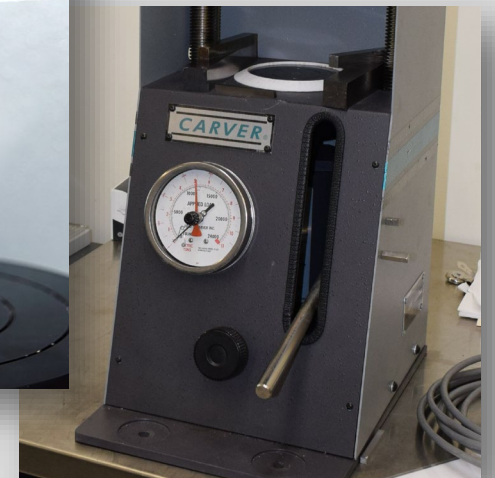
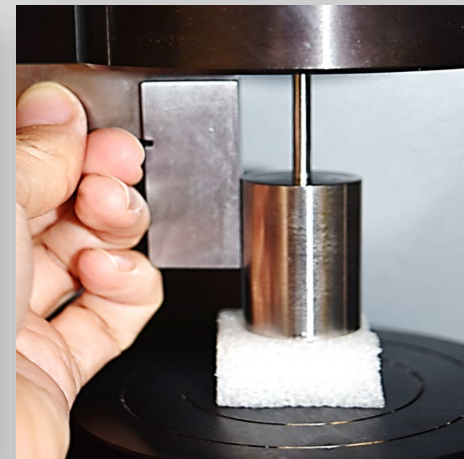
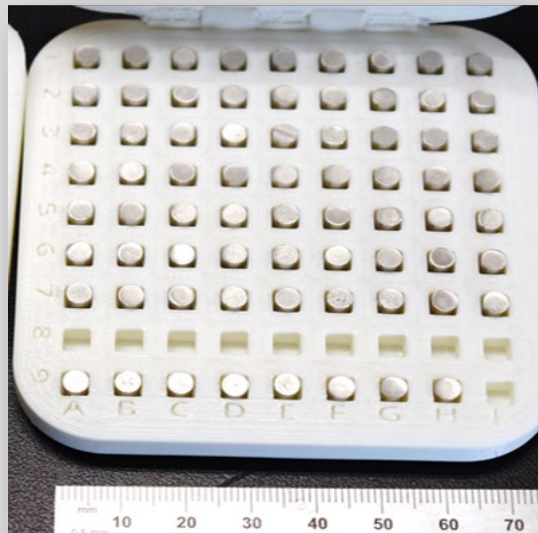
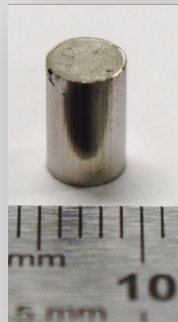
Fabrication Example – Ytterbium Wires

Fabrication of Yb wires from oxide requires muffle furnace, Denton furnace, arc melter, and swager



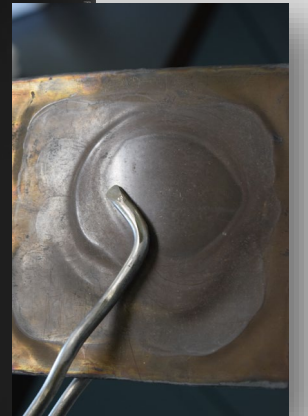
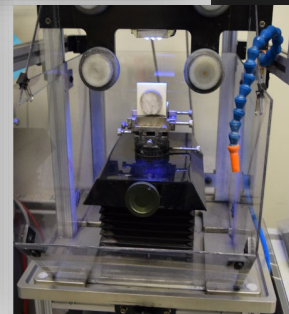
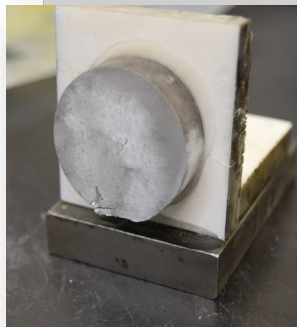
Fabrication Example – Nickel Pellets

Fabrication of Ni pellets from Ni metal powder requires tube furnace and hand press



Fabrication Example – Magnesium Foil

Fabrication of Mg foils from metal in inventory requires rolling mills, welder, furnace, diamond saw, light table



Our team solves interesting targetry questions safely using precious isotopic materials and world-class expertise.

What are some of your trickiest targets?

