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IOWA STATE UNIVERSITY

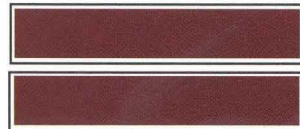
Institute for Physical Research and Technology



Materials

Preparation

Center*



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DES MOINES, IOWA 50319

* A unit of the Ames Laboratory
of the U.S. Department of Energy



FROM THE CENTER DIRECTOR

The Materials Preparation Center (MPC) was established in 1981 to serve the segment of the research community interested in specialized materials, including metals, intermetallic alloys and ceramics. The center is a direct outgrowth of landmark research achievements in very pure metals and compounds made at the Ames Laboratory, a U.S. Department of Energy research facility located on the Iowa State University campus.

At the MPC, we prepare, purify, fabricate and characterize research quantities of these highly specific materials, which are unavailable from commercial suppliers. Our services range from preparing high-purity rare earth metals and compounds to maintaining and sharing a database of information that helps scientists access the most up-to-date information available on specialized materials and services.

The materials we prepare and the services we provide are used throughout the world by both the research community and private industry. Since 1982, we served more than 2,100 scientists — 164 last year alone, including 56 university and government laboratories, 78 industrial laboratories and 30 foreign industries and universities. Our work enables us to assist the research and industrial communities in a variety of ways, ranging from developing processes used to start up new magnetic materials businesses to developing materials used in a treatment for malignant brain tumors.

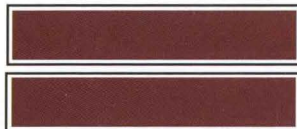
If you would like more information about our capabilities and services, you can reach me by phone at 515-294-5236 or by e-mail at jonesll@ameslab.gov. I would be happy to arrange a visit to our facilities or talk about your specific project needs.

Sincerely,



Lawrence L. Jones

Director, MPC



MATERIALS PREPARATION

Activities in the Materials Preparation Center are built on the internationally recognized achievements of Ames Laboratory scientists who work with very pure rare earth, alkaline-earth and refractory metals in the Lab's Metallurgy and Ceramics Program. Based on the knowledge from this program, the MPC prepares high-purity research grade metals and alloys in single and polycrystalline forms. We also develop the unique processing techniques required for special preparations of rare earth, alkaline-earth, refractory and ultra pure actinide metals.

For unique scientific research, the MPC makes available metal crystals that are among the purest in the world. High-purity single crystals of rare earth, transition and refractory metals and quasicrystalline alloys are available on a custom, best effort basis. Scientists throughout the world have used these crystals to measure the inherent physical properties of pure metals and advance technology in cryogenic actuators, sonar and scintillation detectors for medical imaging.

We serve the scientific community by:

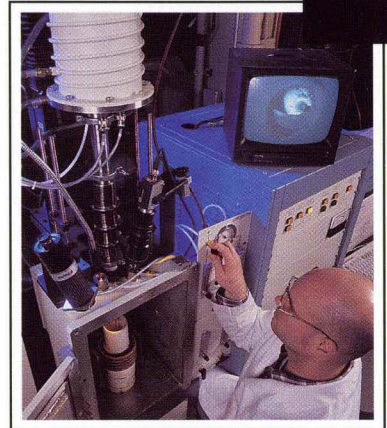
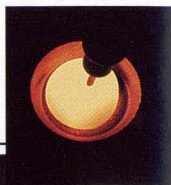
- Responding to requests for materials or services from "off-the-shelf," or with slight processing modifications;
- Preparing well-characterized research materials with highly specialized purity, grain size, homogeneity and/or crystal quality; and
- Transferring new knowledge by providing on-site training on processing equipment and techniques to client representatives.

We exercise prudent confidentiality practices in all our transactions. Formal nondisclosure agreements can be arranged upon request.

ANALYTICAL GROUP

The MPC's analytical capabilities develop characterization techniques and make them available to the general research and industrial communities. The MPC's Analytical Group stresses those techniques that have broad capabilities and are particularly useful for completely characterizing specialized materials. Our analytical capabilities include solution analysis, instrumental techniques and laser mass spectrometry.

In analyzing solutions, we use titrimetric and gravimetric techniques as well as spectrometric methods, flame atomic absorption, graphite furnace atomic absorption and inductively coupled plasma atomic emission spectrometry. These methods help to measure stoichiometry as well as trace level constituents.



Our instrumental techniques include chromatographic combustion, inert gas fusion and x-ray fluorescence. We use these techniques to measure important interstitial impurities, knowledge of which is key to the materials preparation and processing taking place at the MPC.

We also employ Scanning Laser Ionization Mass Spectrometry (SLIMS)—a unique capability that allows highly sensitive surveys of all constituents directly from solid or compacted powder specimens.

ADVANCED MATERIALS PROCESSING

Two areas of emphasis in our Advanced Materials Processing Section are powder processing and plasma arc spray coating.

In processing powders, we use high pressure gas atomization to produce ultrafine metal and alloy powder. We subject molten metal to blasts of high velocity (Mach 3 to 4) pressurized gas, which disintegrates the liquid metal into small droplets. The droplets cool, solidify and settle as powder particles. Because the atomized powders solidify very rapidly, their microstructures have nearly ideal strength, toughness, corrosion resistance and magnetic properties.

The Ames Lab Plasma Spray Facility takes advantage of these ultrafine powders to make new metal and ceramic coatings that provide improved wear or corrosion resistance, thermal and electrical insulation and oxidation protection. Recent work includes developing quasicrystalline coatings and their applications.

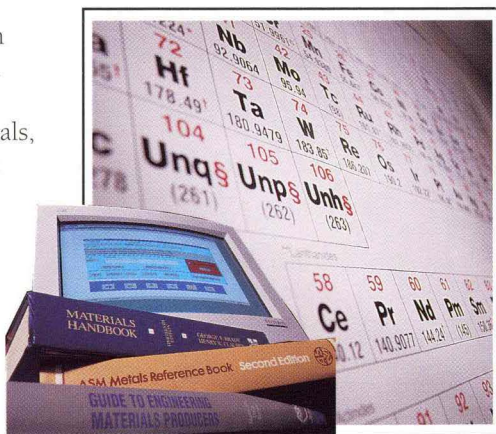
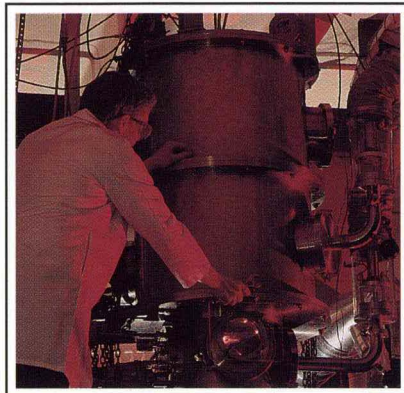
MATERIALS REFERRAL SYSTEM & HOTLINE

Personnel in this area collect, organize and disseminate knowledge about specialized materials resources. Information from more than 2,500 companies and researchers is included in our database. We use the database to locate sources of capabilities for the preparation and characterization of materials, and we respond to inquiries with a referral either to someone who has specific capabilities or to someone with advanced expertise in the area of interest.

Our Hotline number is 1-800-854-1665.

IOWA COMPANIES ASSISTANCE PROGRAM

The Iowa Companies Assistance Program provides opportunities for Iowa companies to access metallurgical information and knowledge from the MPC. Companies needing technical assistance can receive, free of charge, up to 40 hours in services, including: materials preparation, processing and characterization, limited quantities of specialty materials and specialized analytical services. All interactions are confidential.



The Materials Preparation Center is a unit of the Ames Laboratory, which is operated for the U.S. Department of Energy by Iowa State University under contract no. W-7405-ENG-82. The Materials Preparation Center is supported by the Office of Basic Energy Sciences, Division of Materials Sciences. Both the Ames Laboratory and the Materials Preparation Center are members of the Institute for Physical Research and Technology, a federation of research, technology development and technology transfer entities at Iowa State University.

FOR MORE INFORMATION, PLEASE CONTACT:

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