



Magnetic materials

Magnetic materials play a key role for a plurality of technologies of the 21st century. The growing demand for high power permanent magnets on a rare earth basis and the classification of those as critical materials leads to the necessity of development of recycling technologies and new magnetic materials.

Our services

- Inspection of specific material properties via chemical and physical characterization
- Development of magnetic materials and magnetocaloric cooling systems
- Pilot scale production on customer order (melting, rapid quenching, powder processing, shaping and sintering)
- Recycling of electrical machines and Nd-Fe-B-magnets
- Studies of resource criticality

With this approach we develop perspectives for a sustainable and economically wise use of raw materials for the production of magnetic materials. We are glad to advise you and develop answers for your questions.

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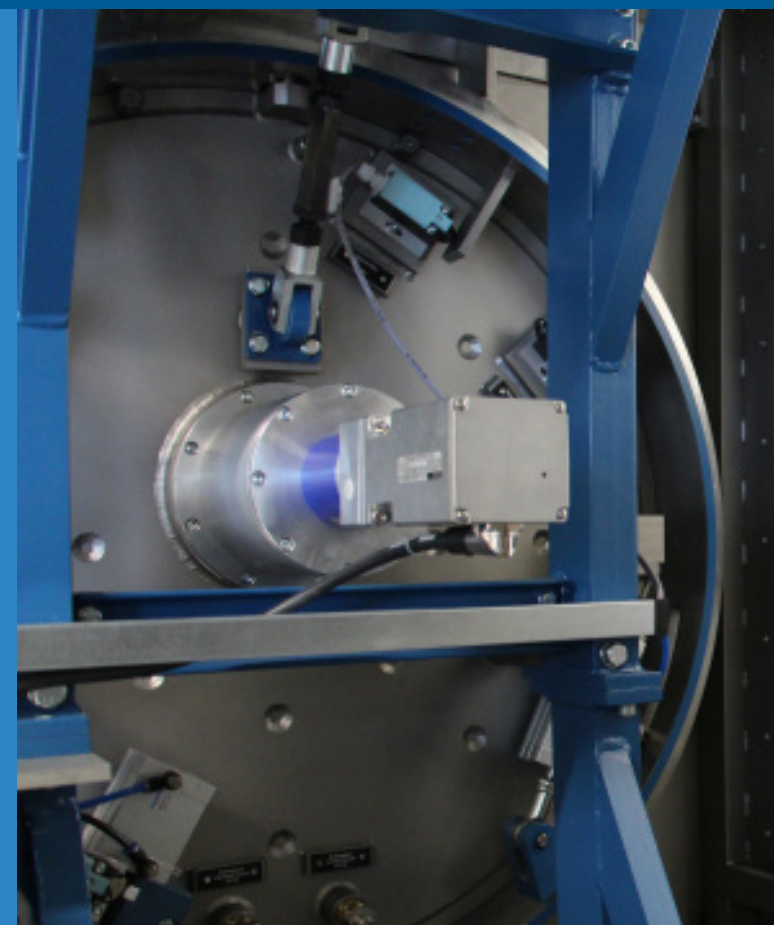
Fraunhofer Project Group Materials Recycling and Resource Strategies IWKS

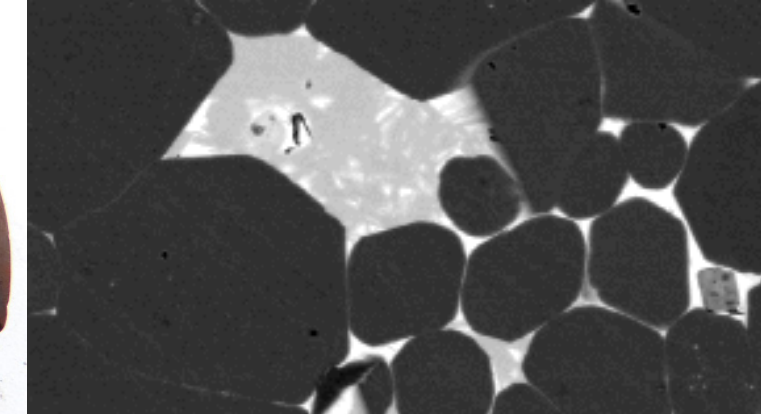
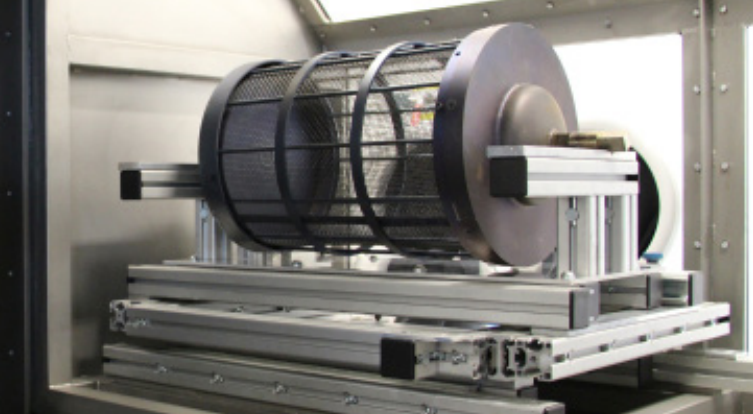
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PERMANENT MAGNETS

INVESTIGATION OF PERSISTENCY AND STABILITY





Hydrogen Treatment

Several metallic materials change under the influence of hydrogen - the strength and the ductility decrease, cracks or even fractures might be formed. In short, hydrogen can significantly reduce the life time of many materials and in the worst case, lead to the failure of entire components. In other areas of application however, the controlled absorption of hydrogen into materials and substances is regarded as extremely beneficial.

In order to investigate the effect of hydrogen on metal alloys or complete assemblies we can provide different devices with a variety of parameters. Therefore we can cover customer- specific problems over a wide range of pressure and temperature values.

Technical equipment

- Pressure range: 5×10^{-3} mbar to 10 bar H_2 -pressure
- (for volumes $< 0,2$ l up to 100 bar H_2 -pressure)
- Useable volume: < 20 l
- Maximum temperature: 500 °C
- Maximum sample weight: 50 kg
- Process gas: hydrogen, argon
- Removal of processed material under inert atmosphere

Highly Accelerated Stress Test (HAST)

During production, handling and storing climatic and thermal influences have an impact on the persistence of certain products and materials. In extreme cases the failure of the material or product might arise.

HAST-Systems (Highly Accelerated Stress Tests) offer the possibility to do highly accelerated endurance tests under various parameters (temperature and relative humidity) to investigate corrosion resistance as well as product quality and stability.

These artificial aging processes can be used for various materials and systems, e.g. permanent magnets, electronical systems and assemblies.

In connection with a wide variety of analytical equipment we offer our customers a holistic comprehension of materials and products.

Technical specifications

- Temperature range: 50 °C to 160 °C
- Humidity range: 75 to 100 % r. F.
- Unsaturated water vapor
- Useable volume: 2×18 l

Analytics

To develop innovative solutions for a secure supply of critical resources, the business units and divisions at the Project Group IWKS work hand in hand with the analytics group to provide its industrial partners with reliable measurements. As part of the Fraunhofer society we offer industry-oriented applied research to link science and economy in order to find the right solution for your problem at hand.

The division for analytics provides its services also to external customers, giving you the opportunity to implement our high end laboratory equipment to resolve your needs.

Core competencies

- Microscopy (3D atom probe, FIB, REM, EDS, WDS, EBSD)
- Diffraction methods (XRD, particle size)
- Elemental analysis (ICP-OES, ICP-MS-LA, RFA)
- Spectroscopy (Raman, IR, UV-VIS, fluorescence)
- Chromatography (HPLC, HPIC, GC)
- Thermal analysis (HT-DSC-DTA-TG-MS, in-situ-HT-XRD)
- Magnetic measurements (PPMS, VSM, Perma-/Remagraph, Kerr-microscope)