

MATERIAL CHARACTERIZATION



INNOVATION

ENGINEERING

OPTIMIZATION

Characterization of Functional Materials

Importance of material characterization

The correlation of physical and chemical properties with structural characteristics, production and preparation conditions is of crucial importance for the development of new products and the optimization of existing products. Comprehensive knowledge of the material properties of a product under production or application conditions is therefore critical for its success.

The dependence of macroscopic product properties on the characteristics of the material on a microscopic level is another important aspect for successful product development and for the solution of production and quality problems.



A selection of typical product materials

At Bayer Technology Services we offer the support you need for your products and processes by identifying these structure-property correlations for you.

Using our expertise and experience to find solutions

With our comprehensive range of methods and our physico-chemical expertise in the field of material characterization, we are your partner of choice when it comes to characterizing your materials or solving problems within your production processes. We adapt our characterization techniques to the problem at hand, going so far as to apply them under operating conditions (in situ). Depending on your requirements, you can choose to take advantage of just our range of specialized analysis and characterization methods or opt for a problem or process-oriented interpretation of the test results in the overall context of the process.

Focal points of our work

As part of a major chemical and pharmaceutical company, we address a wide variety of problems from diverse fields:

- Characterization of catalysts for hydrations, selective oxidations, acid or base-catalyzed processes
- Thermal stability and decomposition behavior of active substances and formulations
- Characterization of granules to determine characteristic structural data in a patent context
- Key surface and density data
- Particle and pore size distributions
- Chemical surface composition and wet chemical elemental analysis
- Permeation and diffusion properties of polymers
- Wetting and drying behavior
- Aging and deactivation phenomena

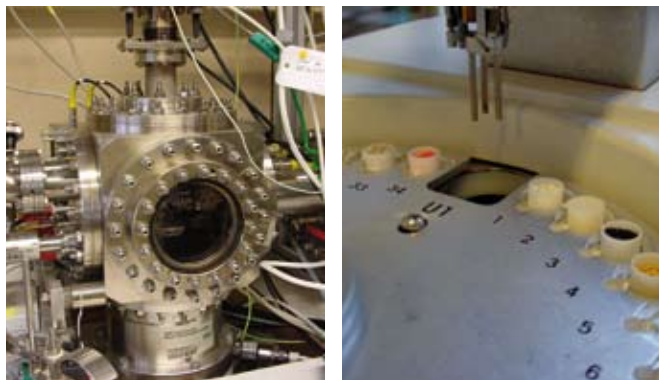


Bayer Technology Services
Powering Your Performance

Our analytical methods

Our range of methods for the characterization of functional materials and catalysts comprises spectroscopic and temperature-programmed methods, sorption techniques and both microscopic and surface analytical methods:

- Physico-chemical investigative methods for structural material characterization under static conditions
 - Chemisorption and physisorption methods
 - Mercury high-pressure porosimetry
 - Helium pycnometry
 - Special density determination methods
 - Thermogravimetry
 - WVTR measuring devices
 - IR and UV vis spectroscopy
 - ICP-OES (elemental analysis)
 - Gas permeation test cell
- Characterization of the dynamic behavior using temperature-programmed methods (TGA-MS, TPD, TPR, TPO)
- In situ characterization of, for example, catalysts under process conditions (DRIFTS, DRUVS, thermogravimetry)
- Specialized analytics such as the unique combination of thermogravimetry and time-of-flight mass spectrometry (TGA-ToF-MS) for a substantial increase in sensitivity and mass resolution during the analysis of components released during thermal decomposition processes.



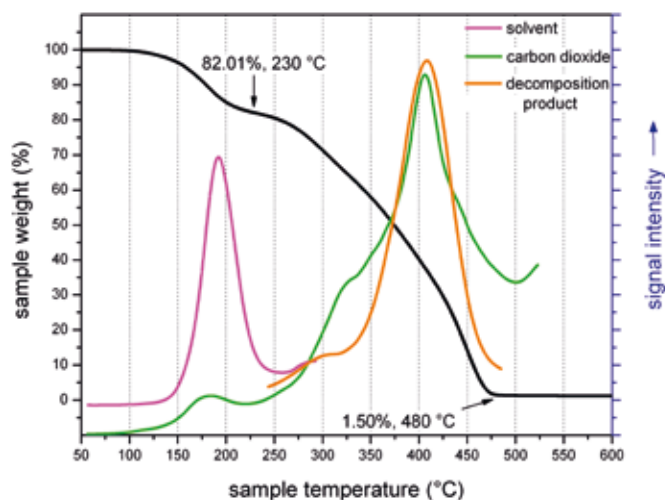
Unique coupling of automated TGA and ToF-MS

Combined analytical methods

In addition to the methods listed above, we also apply combinations of methods to provide additional analytical services in the fields of surface and interfacial physics, nanotechnology and electrochemistry.

- ESCA / XPS (X-ray photoelectron spectroscopy)
- SIMS (secondary ion mass spectrometry)
- SEM/ESEM (scanning electron microscopy)
- TEM (transmission electron microscopy)

- EDX (energy dispersive X-ray spectroscopy)
- Raman spectroscopy
- AFM (atomic force microscopy)
- Profilometry
- CLSM (confocal laser scanning microscopy)
- NAS (nanoparticle aerosol sampler)
- Electrochemical methods (cyclovoltammetry, etc.)



Release/decomposition behavior of a sample of an active substance determined via TGA-MS

In addition, collaboration with universities and scientific institutions provides us with access to complementary analytical methods (e. g. ion scattering, synchrotron radiation methods).

Having direct access to this comprehensive range of combined methods enables our team of scientists from the fields of physics, chemistry and engineering to offer the right analytical technique or combination of methods for your problem.

Our laboratories process your orders according to recognized rules of quality management. We have ISO 17025 accreditation for several physisorption processes, Hg porosimetry and helium pycnometry, and for selected processes of the SEM, TEM and SIMS analytical methods.

