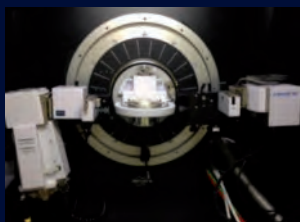


Technical specifications

Bruker D8 A25 Powder Diffractometer

- Cu and Ag X-ray sources
- Non-ambient chamber to measure in the range 0 to 900°C under inert, in both oxidizing and reducing atmospheres
- Capillary stage to measure in transmission configuration
- Rotary sample stage to measure in Bragg-Brentano configuration
- Incident and diffracted motorized slits
- Focussing mirrors for capillary measurements
- Fast linear detector with energy filtering



Panalytical Empyrean Powder Diffractometer

- Cu X-Ray source
- Rotary sample stage with 15 positions auto-changer to measure in Bragg-Brentano and transmission configurations
- Standard stage for flat specimen holder for measuring at low angles
- Multipurpose stage for solid samples up to 10 kg
- Motorized slits of incident and diffracted beam
- Cu secondary monochromator
- Parallel mirror for Cu and collimator for grazing angle diffraction measurements
- Fast linear detector



www.energy.imdea.org



Nº Registro: 369



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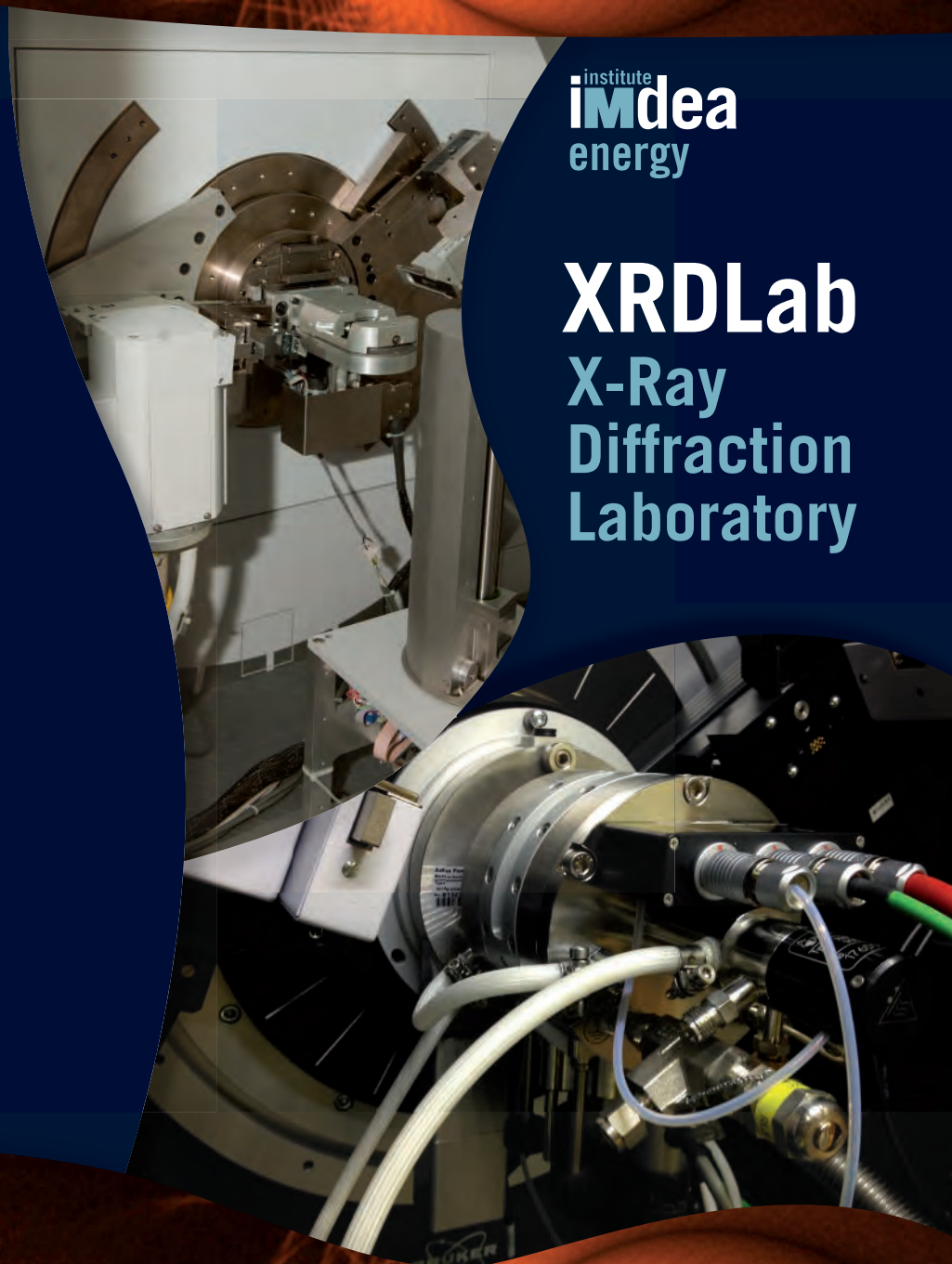
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institute
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XRDLab

X-Ray Diffraction Laboratory



X-Ray Diffraction Laboratory



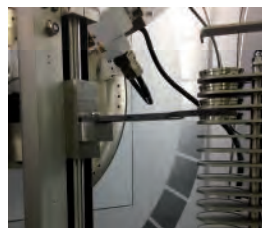
The IMDEA Energy Institute has a modern **X-ray diffraction laboratory** with two advanced X-ray diffraction powder tools with multiple accessories that cover a wide range of materials and possible applications of this technique. This laboratory is a member belonging to the Network of Laboratories Redlab with registration No 369.

The laboratory has all the necessary elements to perform X-Ray diffraction experiments under **Bragg-Brentano** and **transmission** configurations with standard and capillaries holders. Further analysis can be made with **low angle X-Ray diffraction**, a fundamental tool for the analysis of meso-structured materials, and **grazing incidence X-ray diffraction** for the study of thin layers. These experiments can be performed in very short intervals due to the use of more sophisticated and rapid linear detectors, one of them with energy filtering.

The **XRD Lab** has a **reaction chamber** for obtaining diffraction patterns in different gas atmospheres (10^{-3} to 10 bar pressure) and at different temperatures (**up to 900 °C**). With the development of a gas control unit system it is possible to work with **H₂, CO₂, He, Ar, air**, and an auxiliary gas controlling the flows via software, or even using mixtures of gases. In this way, different working conditions can be designed, obtaining the X-ray diffraction patterns and accurately capturing the phase transformations, oxidations, reductions, thermodynamic cycles, etc. It is also possible to connect with a gas analysis system.

One of the diffractometers has Cu radiation and **Ag high energy radiation** and the optics necessary to perform X-ray analysis in appropriate conditions to obtain Pair Distribution Functions (**PDF**). This technique not only allows for the study of crystalline materials, but also the study of the distributions of nanoparticles in a matrix, or the short-range arrangement in semi-crystalline or even amorphous materials.

Types of analysis and services



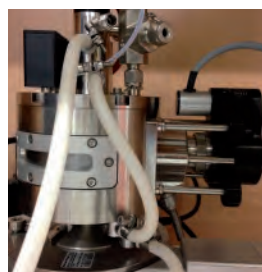
Bragg-Brentano measurements

- Theta-2theta, theta or 2theta scans
- Low angle 0.5 - 10° diffraction
- Grazing incidence X-ray diffraction
- Secondary monochromator for Cu
- Energy filtering linear detector



Transmission measurements

- Standard kapton foils holders
- Capillaries of different diameters using Cu or Ag sources

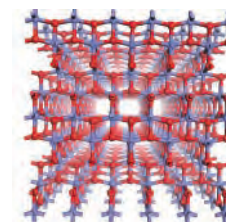
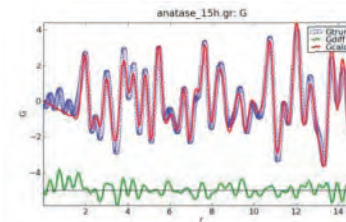


Measurements under non-ambient conditions

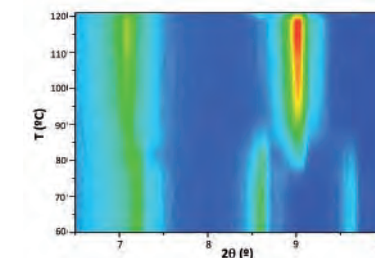
- Up to 900°C
- H₂, CO₂, He, Ar, and synthetic air, or mixtures of gases
- Other gases are possible
- Pressures from 10⁻³ to 10 bar
- Mass flow controlled 2 to 100 ml/min
- Cu or Ag X-Ray sources

Pair Distribution Function (PDF)

- With capillary and Ag X-Ray source
- Q function and pair distribution functions analysis
- Liquid and powder materials



Crystalline phases identification and semi-quantitative under work conditions



Crystallite size and micro-strain determination

