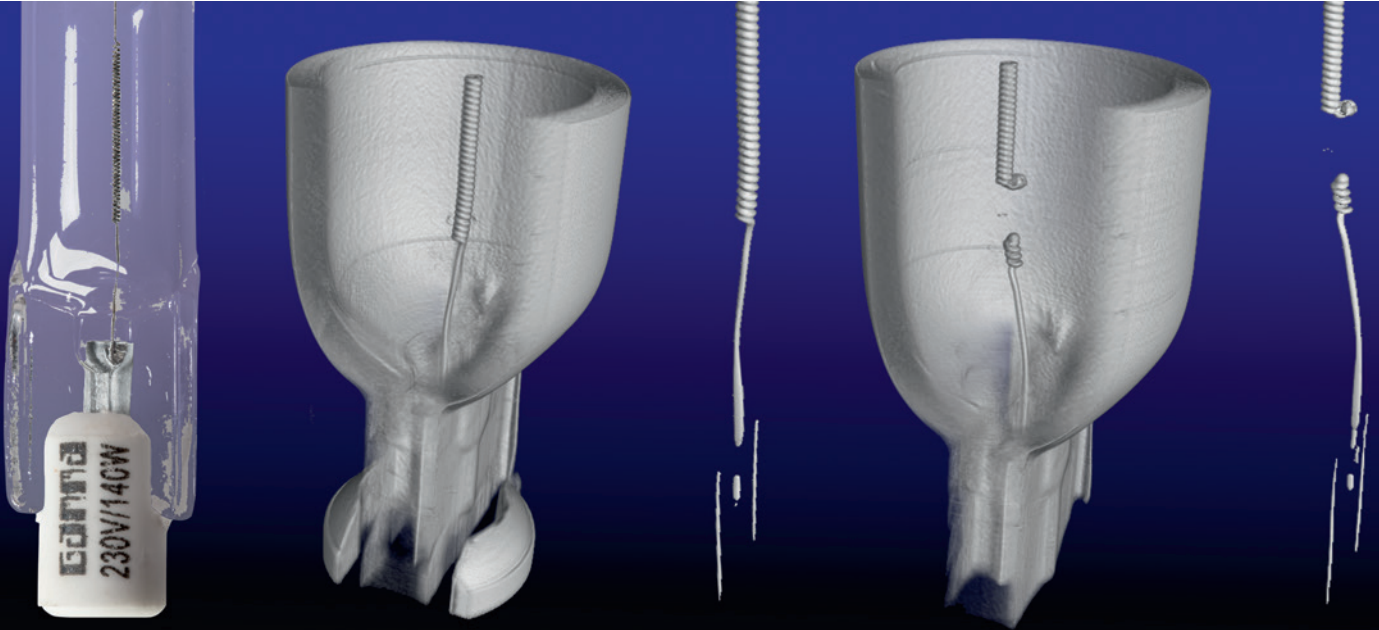


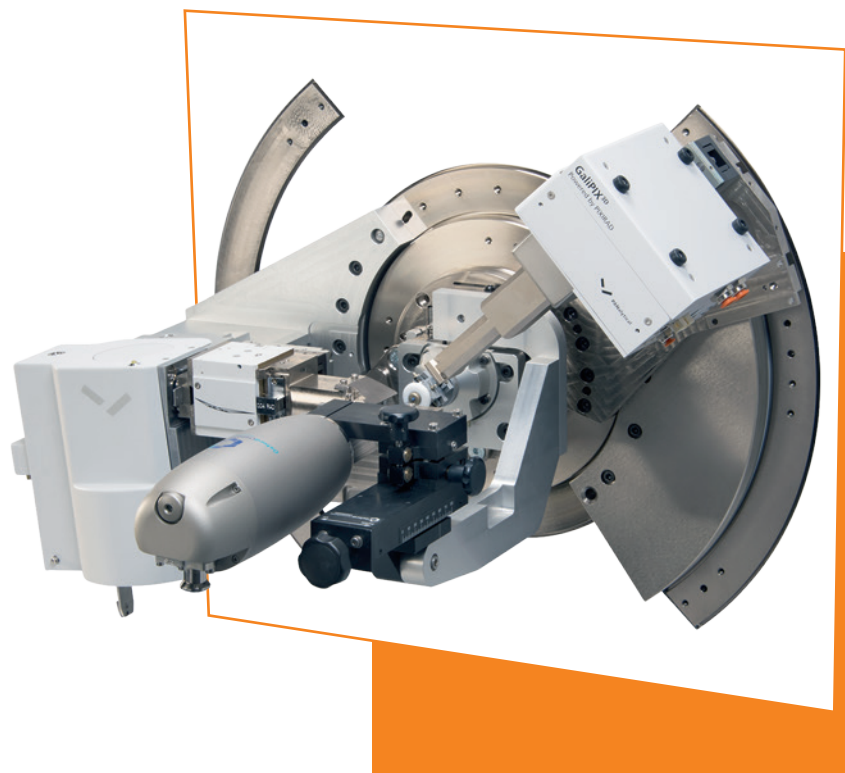


PANalytical
get insight



Empyrean

See more with hard radiation



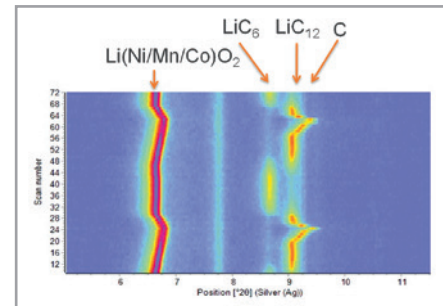
Discover the benefits of hard

Hard X-radiation (e.g. Mo radiation at ~17.4 keV or Ag radiation ~22.1 keV) have several benefits compared to soft X-radiation.

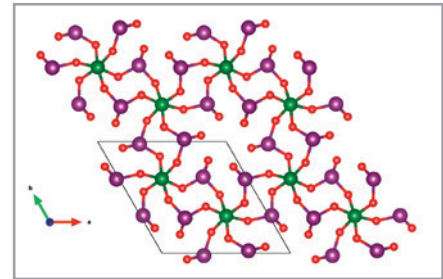
Hard radiation:

- increases the probed volume and improves the sample averaging for standard powder measurement
- permits transmission XRD measurements through absorbing materials
- enables more accurate determination of bond distances and thermal parameters (U_{iso})
- allows to perform pair distribution function (PDF) measurements by extending the available q -range (up to 22 \AA^{-1} for Ag radiation)
- increases the penetration depth, required for example for computed tomography of thicker or more absorbing samples
- is ideal for *in operando* studies of batteries, with the possibility to study both anode and cathode at the same time directly inside standard pouch cells
- removes the fluorescence for samples containing transition metals
- empowers measurements with the Anton Paar high-pressure chamber (HPC 900) or diamond anvil cells
- facilitates the determination of retained austenite in steel with Mo radiation according to ASTM standard E975-13

Examples



In operando measurement of a commercially available prismatic cell



Crystal structure representation of $Fe(IO_3)_3$. Green atoms are iron atoms, purple atoms are iodine atoms and red atoms are oxygen atoms. The O_3 atom is facing the empty channel.

Your partner of choice for hard radiation applications

- The instrument enclosure is designed for continuous operation at 60 kV excitation voltage, for maximal flux of Mo and Ag K-alpha radiation
- Proprietary manufacturing facility for X-ray sources
- Wide range of X-ray sources for diffraction measurements, ranging from Cr all the way up to Ag radiation, optimized to work with sensitive mirror optics
- High-quality X-ray focusing mirrors for transmission geometry
- Optimized optical path for low and featureless background
- Ample experience in using hard radiation for non-ambient experiments
- Offering the most efficient detector for hard radiation on the market, the CdTe-based GaliPIX^{3D}



radiation

The most efficient detector
for hard radiation



GaliPIX^{3D}

- CdTe sensor
- 100% efficient from Cu to Ag radiation
- 60 μm pixel size
- 501 x 465 pixels
- cooled sensor for best performance
- two level energy discrimination

Moly is the new copper

Curious? We have collected all our relevant documentation on various hard radiation applications, ranging from crystallography, pair distribution function to computed tomography and battery investigations.

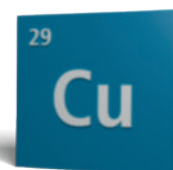
Visit our webpage

www.panalytical.com/hard-radiation

to find the latest data sheets, view webinars and read more about the advantages of hard radiation in a new white paper.



IS THE
NEW



About PANalytical

PANalytical's mission is to enable people to get valuable insight into their materials and processes. Our customers can be found in virtually every industry segment, from building materials to pharmaceuticals and from metals and mining to nanomaterials. The combination of our software and instrumentation, based on X-ray diffraction (XRD), X-ray scattering, X-ray fluorescence (XRF) and near-infrared (NIR) spectroscopy as well as pulsed fast thermal neutron activation (PFTNA), provides our customers with highly reliable and robust elemental and structural information on their materials and is applied in scientific research and industrial process and quality control.

PANalytical employs over 1,000 people worldwide. The company's headquarters are in Almelo, the Netherlands. Fully equipped application laboratories are established in Japan, China, the US, Brazil, and the Netherlands. PANalytical's research activities are based in Almelo (NL). Supply and competence centers are located on two sites in the Netherlands: Almelo (X-ray instruments) and Eindhoven (X-ray tubes), in Nottingham, UK (XRF applications and standards), in Quebec, Canada (fusion sample preparation) and in Boulder CO, US (near-infrared instruments).

PANalytical is active in all but a few countries of the world with a worldwide sales and service network that ensures unrivalled levels of customer support.

The company is certified in accordance with ISO 9001 and ISO 14001.

Visit www.panalytical.com for more information about our activities.

PANalytical is part of Spectris plc, the productivity-enhancing instrumentation and controls company. Since 1 January 2017 PANalytical has merged its activities with Malvern Instruments, a UK-based provider of materials and biophysical characterization technology and also an operating company within the Materials Analysis segment of Spectris.



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Adding value to your processes

Industry's largest pool of specialists to create analytical solutions that are crucial for your processes and add value to your business and activities.

- On-site training
- Training courses
- Performance optimization and validation
- Analysis services and customized reference materials
- Multi-laboratory standardization

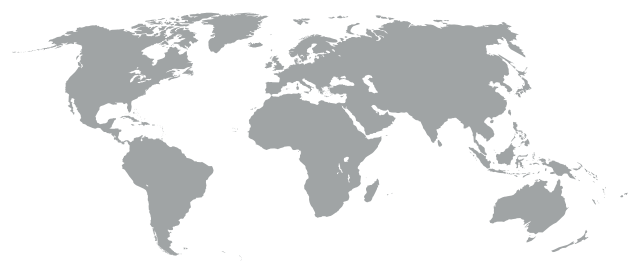
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Worldwide network of experienced engineers to ensure rapid response and maximum uptime.

- Phone and remote support
- Preventive maintenance and check-ups
- Flexible Care Agreements
- Performance certificates
- Hardware and software upgrades
- Local presence
- Local stock of spare parts

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