Modern non-ambient X-ray diffraction for the investigation of minerals, metals and industrial materials of any type

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Modern powder X-ray diffraction (XRD) systems must nowadays be able to meet the challenges faced by multi-user and multi-application facilities. Instruments must be capable not only of routine XRD measurements, but also have to offer advanced capabilities such as measurements under non-ambient conditions (varying temperature, pressure, gas atmosphere, humidity, …) which can drastically change material properties.

The recently launched XRDynamic 500 automated multipurpose powder X-ray diffractometer from Anton Paar (Fig. 1) has set new standards in terms of data quality, automation and efficiency for laboratory powder diffractometers. The core of XRDynamic 500 is the TruBeam™ concept that comprises a large goniometer radius and evacuated optics units, automatic change of the beam geometry and all optics components, and automated instrument and sample alignment routines. All of these features combine to deliver outstanding data quality that can be measured with high efficiency in a straight-forward manner. The high level of automation means that you can perform measurements on one or many samples with different geometries and instrument configurations in one batch with no user intervention needed.

XRDynamic 500 can also be equipped with different non-ambient attachments to perform measurements under non-ambient conditions. These attachments are perfectly integrated into the hard- and software (plug-and play mode, integrated control unit, built-in connections) and guarantee best-in-class convenience for your non-ambient XRD studies.

To highlight the potential of XRDynamic 500, we will present key instrument features and benefits in addition to recent application data on non-ambient diffraction. Examples include in-situ structural changes of bentonite samples and materials used for technical applications (Fig. 2), how salt mineral compositions change under the influence of gas and humidity, and the study of the tempering temperature on the properties of steel.

Figure 1. The XRDynamic 500 automated multipurpose powder X-ray diffractometer from Anton Paar.

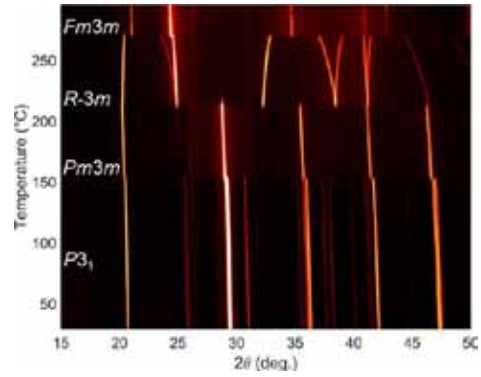

Figure 2. Temperature-induced phase transitions of $RbNO_3$ (Weidenthaler & Ternieden, 2022).

Weidenthaler C, Ternieden J (2022): Data measured by C. Weidenthaler and J. Ternieden (Max-Planck-Institut für Kohlenforschung, Mülheim an der Ruhr, Germany