MS50-P2 **A variety of techniques to asses particle size using a laboratory X-ray diffractometer.** Jan André Gertenbach,[a] Marco Sommariva,[a] [a]*PANalytical BV, Almelo, Netherlands*
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There is ongoing interest in nanoparticles as materials with unique properties that have applications in a range of fields including catalysis, semi-conductors, gas storage amongst many others. A critical feature of the materials is particle size and the particle size distribution. To this end a number of diverse techniques exist for determining the dimensions of the particles. In this study a variety of distinct techniques were used that were localised on a single X-ray diffractometer. In particular Small-Angle X-ray Scattering (SAXS) studies and the Pair Distribution Function (PDF) of nano-sized TiO_2 and ZnO powders were measured at the lowest and highest scattering angles respectively. The results were compared to the output from the more traditional Scherrer technique. The effect of temperature on particle size was also investigated.

Keywords: particle-size measurement; nanoparticles; powder diffraction

MS50-P3 **High-brightness X-ray sources for biological crystallography.** Jürgen Graf,[a] Andreas Kleine,[a] Carsten Michaelsen,[a] Christoph Ollinger,[b] Joachim Lange,[b] Oscar Hemberg,[c] [a]*Incoatec GmbH, Geesthacht, Germany,* [b]*Bruker AXS GmbH, Östliche Rheinbrückenstr. 49, Karlsruhe Germany,* [c]*Excillum AB, Finlandsgata 14, Kista, Sweden.*
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Modern microfocus X-ray sources define the state-of-the-art for single crystal diffraction and small-angle scattering. These sources are usually combined with multilayer X-ray mirrors which are excellent X-ray optical devices for beam shaping and preserving the source brightness [1].

Microfocus rotating anode systems deliver flux densities in the range of 10^{11} photons/s/mm^2 at power loads of a few tenths of kW/mm^2. Low power microfocus sealed tube sources represent an interesting low-maintenance alternative to rotating anode generators [2]. Power loads of several kW/mm^2 in anode spot sizes of < 50 µm deliver a small and bright beam. Flux densities of up to 10^{10} photons/s/mm^2 can be achieved in a focused beam suitable for most protein crystals and poorly diffracting small molecule samples.

The brightness of conventional X-ray sources using a solid metal target is limited by the thermal properties of the anode material and by the heat dissipation mechanism which sets a hard limit for future improvements of X-ray sources based on solid metal targets. However, recent breakthroughs in X-ray source technology push the limits further. Using high-speed liquid metal-jet targets (e.g. a Gallium alloy) instead of fast spinning solid metal targets, power loads of several hundreds of kW/mm^2 can be achieved [3, 4]. This new type of source paves the way for home-lab instruments with low maintenance and intensities comparable to bending magnet sources when combined with state-of-the-art multilayer mirrors.

We will be presenting selected results to demonstrate the impact of these modern microfocus X-ray sources on the data quality for applications in small molecule and biological crystallography.

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