A variety of techniques to assess particle size using a laboratory X-ray diffractometer. Jan André Gertenbach, Marco Sommariva, 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 TiO2 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