

POSSIBILITIES AND LIMITATIONS OF X-RAY DIFFRACTION USING HIGH ENERGY X-RAYS ON A LABORATORY SYSTEM

Hans te Nijenhuis, Milen Gateshki and Martijn Fransen

PANalytical, Almelo, The Netherlands

The recent interest in nanomaterials has increased the need to analyze structures on a local (nano) scale. However, the atomic structures of nanoparticles and nanostructured materials are not accessible by conventional methods used to study crystalline materials, because of the short ordering range in these materials. One of the most promising techniques to study nanostructures using X-ray diffraction is total scattering pair distribution function (PDF) analysis. This technique is successfully applied in a number of application areas in materials science and technology.

The PDF analysis technique makes use of high quality, high energy X-ray scattering data, usually obtained at synchrotron facilities, available in several national and international research centers around the world.

Despite the advantages and data quality that measurements at synchrotron beam lines offer to the researcher, in practice it can be difficult and time-consuming to get access to the facilities required. In order to be prepared as good as possible and to make optimal use of the valuable experiment time offered, it is highly desirable to perform selective measurements on candidate samples in the own research laboratory.

In this study, we have investigated the possibilities and limitations of the use of high-energy X-rays on a homelab system. We will answer this question and illustrate it with examples.