X-RAY NANODIFFRACTION MEETS MATERIALS SCIENCE

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The experimental setup at the Nanofocus Endstation of P03 beamline (PETRA III, Hamburg) is one of the very few places in the world that provides the experimental conditions for X-ray nanodiffraction.

X-ray nanodiffraction is a relatively novel technique and, as will be shown, an excellent tool for materials science. It readily serves structural information with sub-µm spatial resolution from crystalline and semi-crystalline materials (e.g. metals, biomaterials, synthetic compounds). The microstructure, residual stress profiles and even the crystal structure of the given material can be obtained in a way that is not accessible to methods like optical or electron microscopy.

This technique requires an X-ray beam be sufficiently intense and focused to a sub-µm size and it is therefore available only at synchrotron radiation sources, i.e. at large scale scientific facilities, of which only a couple exist in Europe and in the US. The high potential of this technique and our strong focus on materials science will be demonstrated using individual examples from past experiments.

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