X-RAY AND NEUTRON SCATTERING FOR THE EXAMINATION OF MICRO- AND NANOSTRUCTURED MATERIALS

RTG A NEUTRONOVÝ ROZPTYL PŘI ZKOUŠENÍ MIKRO A NANOSTRUKTURNÍCH MATERIÁLŮ

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Abstract
For a long time, X-rays and neutrons have served as probes for the study of microstructures in materials. Diffraction and scattering experiments, if possible complemented by electron microscopy, are often decisive for the understanding and control of materials properties. The availability and continuous improvement of dedicated synchrotron radiation X-ray facilities and neutron scattering instruments have also attracted many materials scientists. Some recent applications of neutron and X-ray scattering will be discussed with emphasis on experiments pushing the limits of spatial and temporal resolution of both types of radiation or using their individual characteristics and complementarity. For example in alloys, inhomogeneities ranging in size from a few interatomic distances to several micrometers, give rise to diffuse and small-angle scattering. With the combination of appropriate tools, the size and temporal evolution of, e.g., precipitates can be studied with good accuracy, even in-situ, as illustrated by the case of binary nickel alloys. The results help to test and improve models of nano- and microstructural features of materials. Prospects for future developments will be briefly discussed.

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