

## **High resolution imaging of strain, crystal structure and defects by 2D and 3D X-ray diffraction**

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X-ray diffraction and X-ray imaging have for one century mostly been regarded as two distinct applications of the same type of radiation. Traditionally X-ray diffraction is considered as a method with poor spatial resolution yielding only spatial averages as useful results. Recent developments in the use of highly focused beams produced on the most advanced synchrotron sources show however a great and rapidly developing potential of diffraction imaging techniques. These are much improving the resolution of traditional X-ray imaging and topography but are as well combined with X-ray diffraction. In this way a new portfolio of techniques emerges, coupling the information of strain and texture with spatial information. As so far most of these new imaging techniques are brilliance limited they are naturally developed at synchrotrons. With the rapid development of the availability of synchrotron radiation, new imaging techniques rapidly gain practically all fields of materials science and biomedicine. While X-ray optics typically limit today's practical resolution to about 50 nm, technological progress in this field, as well as the use of reconstruction techniques pave already the way towards nanometric resolution in space while preserving the structural information available through diffraction. With new source projects at the horizon these exciting imaging techniques will be established on a growing number of beamlines.