

Combined use of X-ray imaging and diffraction techniques for investigation of deformation and damage mechanisms at the grain scale

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X-ray imaging techniques reveal features with absorption contrast inside materials. Damage by fatigue cracking, corrosion, or ductile cavitation can therefore be investigated in-situ and in 3D. Diffraction is sensitive to the crystal structure of the material, and so recently developed diffraction imaging techniques can reveal the grain structure of polycrystalline materials, adding further insights to in-situ studies. Furthermore, careful analysis of the diffraction data can reveal elastic strain tensors, grain rotations, or reveal the evolution of sub-grain deformation structures. This talk will give an overview of currently available techniques with reference to recent results, and discuss developments in progress.