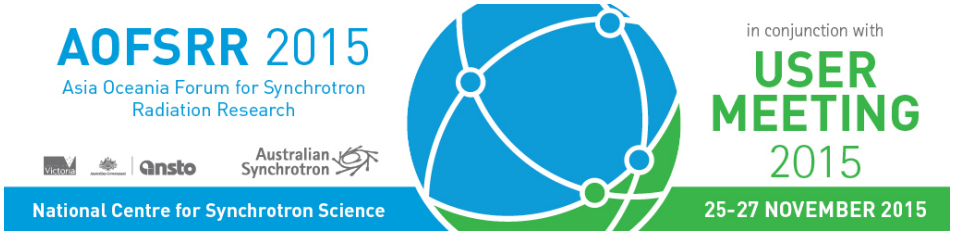

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Orientation and strain determination using the Maia detector

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X-ray micro-beam Laue diffraction is a powerful tool for mapping the orientation and elastic strain within polycrystalline materials. Microscale interactions between neighbouring grains influence the macroscale behaviour of a material, particularly its deformation behaviour and damage mechanisms such as cracking which is often initiated in the intercrystalline regions. Widely used deformation models are often inconsistent with experimental observations of fatigue behaviour in polycrystalline and multiphase materials and raise intriguing questions about deformation behaviour at the microscale. Here we report on recent experiments using energy scanning diffraction of a polycrystalline nickel foil at the XFM microprobe. We find that the elastic back scatter measured in the pixelated Maia detector permits determination of the local crystallographic orientation within the polycrystalline foil. The shape and location of the Bragg peaks measured in the energy scan is shown to reveal information about the strain state of the sample. The results highlight how the combination of spatial and energy resolution offered by the Maia detector enables new types of experiments to be performed not possible with either conventional 1D energy-resolving, or 2D monochromatic detectors.

Keywords

Laue diffraction, orientation, strain, Maia detector

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