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INSIGHTS INTO DISLOCATION GRAIN-BOUNDARY INTERACTION BY X-RAY μ LAUE DIFFRACTION

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The deformation behavior of metallic single crystals is size dependent, as shown by several studies during the last decade. Nevertheless, real structures exhibit different interfaces like grain, twin or phase boundaries. Due to the possibly higher stresses at the micron scale, the poor availability of dislocation sources and the importance of diffusion in small dimensions the mechanical behavior of samples containing interfaces can considerably differ from bulk material.

In the talk we show the first in situ μ Laue compression experiments on micron sized, bi-crystalline samples. Three different grain-boundary types will be presented and discussed (i) Large Angle grain Boundaries (LAGBs) acting as strong obstacle for dislocation slip transfer; (ii) LAGBs allowing for easy slip transfer and (iii) coherent σ_3 twin-boundaries. The talk will focus on pile-up of dislocations, slip transfer mechanisms, storage of dislocations and dislocation networks at the LAGB.