

## **From single grains to texture**

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Using high energy synchrotron X-ray diffraction, the evolution of the microstructure of a cylinder of cold rolled and annealed pure copper was tracked during axial compression. Movies of 2D diffraction patterns were recorded during deformation. Starting from large grains, subgrain formation, grain rotation and subsequent grain refinement were observed dynamically with the evolution of the mosaic spread merging into a continuous texture. Ex-situ texture measurements were conducted to obtain full pole figures which indicate that a fiber texture was well approached. In order to explore the mechanics of grain rotation and grain refinement under unidirectional deformation, single crystal pure copper was tested in a similar setup. The results show the different deformation preferences in f.c.c structural material compared with the macroscopic loading direction. The level of grain torsion and critical resolved shear stress values along various directions were analyzed.

Keywords: plastic deformation mechanisms; lattice strain; single crystal;