# Orientation Distribution and Microstructure Change of Cold Rolled Aluminum Alloys Before and After Annealing

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The neutron beam possesses high penetration capacity, easy to obtain bulk average information about lattice deformation and orientation rotation of polycrystalline materials simultaneously. Moreover, the divided detectors of the time-of-flight neutron bank have approximate angle resolution, able to evaluate the microstructure changes using the residual strain pole figures. Here, two cold rolled aluminum alloys before and after annealing were employed here as a reference for promoting the complimentary usage of crystallographic orientation and residual strain evaluation during the optimization of sheet production process.

The investigated materials were the 50% uni-directional cold rolled aluminum alloy before and after annealing. The time-of-flight neutron diffraction spectra of 10x10x10 $mm^3$ stacked samples were acquired at a stereographic angle step of $\chi$=20°, $\phi$=15°, where the samples were completely bathing in neutron beam. The single peak fitting integrated intensities were analyzed to calculate the pole figures, and the simultaneous Rietveld refinement of time-of-flight neutron diffraction spectra from different orientations were carried out to calculate the pole figure. The two methods led to a good similar pole figures to each other, and the further discussion will be given out in the poster.