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Overview on the Transformations in Austempered Ductile Iron

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Austempered ductile iron (ADI) has undergone a special heat treatment to enhance mechanical properties. This heat treatment process consists of austenitization, quenching to a temperature between 250°C and 450°C and isothermal austempering, after which the microstructure consists of acicular ferrite and high carbon enriched retained austenite.

The high carbon enriched retained austenite can transform to martensite during plastic deformation. The treatment parameters (austenitization temperature, austempering temperature, austempering time and alloying composition) can influence the retained austenite fraction, grain size and its stabilization, which in turn will influence the following martensitic transformation.

The influence of different treatment and composition parameters on the martensitic transformation and texture formation during plastic deformation has been investigated using neutron and synchrotron diffraction. The combination of texture analysis and in-situ deformation tests allowed quantitative phase analysis and extraction of martensite phase fractions as a function of strain level.

In this presentation, we will give an overview of the current status of these experiments together with new results from recent atom probe tomography measurements.

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