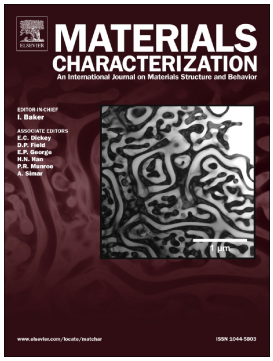


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# Evaluation of austenite volume fraction in TRIP steelsheets using neutron diffraction

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Abstract: The volume fractions of austenite in hot rolled and heat treated TRIP steel sheets were evaluated using time-of-flight (TOF) neutron diffraction through four different methods. They include the conventional analysis method with random texture assumption, the conventional correction method of (*hkl*) peak intensities, the Rietveld refinement method using the simply summed spectrum without distinguishing the specimen orientations of all the TOF spectra, and the combined Rietveld analysis method for multiphase textures and constituent phase volume fractions. It was found that for a nearly random TOF spectrum obtained by the simple summation of all the measured TOF neutron spectra, the Rietveld refinement provided a relative satisfactory evaluation precision for the austenite volume fraction. Moreover, the precision can be further improved through the simultaneously combined Rietveld analysis method for multiphase textures and constituent phase volume fractions through using all the measured TOF neutron spectra directly. If the texture measurement is unavailable, it is suggested to measure the TOF neutron spectrum through setting the scattering vector along the transverse direction (TD), and to analyze the $f_A$ using conventional correction method of (*hkl*) peak intensities. In addition, together with the microstructure observations and the tensile properties evaluation of these TRIP steels, it was confirmed that the increment of $f_A$evidently improved the combinations of tensile strength and uniform elongation (TS□UEl)of TRIP steels.

Keywords: TRIP steel, retained austenite, texture, neutron diffraction, volume fraction.