



	Experiment title: Evolution of phases during heat-treatment of super-bainitic steels	Experiment number: me1158
Beamline: ID31	Date of experiment: from: 02 Feb 2005 to: 08 Feb 2005	Date of report: 25 Feb 2010
Shifts: 15	Local contact(s): Francois Fauth	<i>Received at ESRF:</i>
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Report:

Results were published as ‘Synchrotron X-ray Studies of Austenite and Bainitic Ferrite’, H. J. Stone, M. J. Peet, H. K. D. H. Bhadeshia, P. J. Withers, S. S. Babu, and E. D. Specht, Proceedings of the Royal Society A, Vol. 464, 2008, 1009–1027.

High resolution synchrotron X-ray diffraction was used to conduct *in situ* studies of the temporal evolution of phases during the isothermal growth of bainite. Two populations of austenitic material were identified: one corresponding to the initial austenite, the other to the carbon-enriched austenite associated with the bainitic ferrite. The observed lattice parameters and the asymmetry of the peaks from the residual austenite have been interpreted in terms of the carbon partitioning due to the transformation. The results are contrasted with an earlier study in which the austenite unit cell appeared to split into two distinct densities prior to the onset of transformation.

The work proves that the austenite remains homogeneous prior to bainitic transformation, and that the reaction remains thermodynamically incomplete. The results therefore provide further support for a mechanism in which bainite growth is diffusionless, with carbon partitioning occurring subsequent to transformation.

