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# APPLICATION OF ELECTRON TOMOGRAPHY FOR MICROSTRUCTURAL CHARACTERISATION OF FERRITIC STEEL

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Of recent times, efforts in the field of electron microscopy are aiming at observing near atomic resolution and visualising the third dimension of the object of interest. The development of electron tomographic imaging for application to materials science is expected to offer many advantages for structural engineering materials in designing for high temperature applications. It is envisaged that application of this advanced technique would be useful in understanding materials. Present paper aims to apply Electron Tomography for imaging the secondary carbides in ferritic steels.

It is known that ferritic steel exhibit improved toughness in the heat-affected zones. This is related to the size, shape of the carbides and their inter-particle spacing. In order to understand the shape of the particles electron Tomography could be adopted. It involves acquiring images at regular angular intervals using either Z-contrast high angle annular dark field imaging or Energy Filtered imaging. Followed by reconstruction of the 3-dimensional image is obtained out using suitable software.

A carbon replica of the ferritic steel was prepared and Electron Tomography of the carbides present was carried out by observing the sample in high angular annular dark filed imaging by conducting the imaging at various tilts ±56°. In a similar way, a series of images were obtained in energy-filtered mode using C elemental mapping. These images were aligned and reconstructed to obtain the three-dimensional image. While the conventional transmission electron microscopic images of the sample reveal the recrystallised laths with finer carbides and well-grown ones on prior austenite boundaries, the electron tomographic image shows the three dimensional nature of the carbides distinctly. The present paper demonstrates the technique in detail with a typical application of ferritic steel as an example.