

EXMONAN

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Kinetics of phase separation in Fe-Cr alloys and refractory carbides

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The isostructural transformation within the miscibility gaps of Fe-Cr alloys and TiC-ZrC has been studied experimentally and theoretically. It is shown that for Fe-Cr alloys a combination of experimental techniques such as Small Angle Neutron Scattering, Atom Probe Tomography and Transmission Electron Microscopy gives a more complete picture of the important early stages of phase separation compared to just using one technique. Theoretically, the phase separation is modelled using the non-linear Cahn-Hilliard equation with CALPHAD data as input. In the TiC-ZrC system the mechanism of phase separation and morphology of the decomposed phases are found to be affected by the strong coherency strains present. The connection between the resulting lamellar structure and the measured hardness of the decomposed carbide is discussed.