Martensite formation in Fe-C alloys at cryogenic temperatures

Magnetometry was applied to quantify the fraction of austenite retained in Fe-C alloys subjected to various treatments. These treatments consisted of: (i) water quenching; (ii) water quenching followed by immersion in boiling nitrogen and again in water; (iii) as for (ii) but re-heating from 77 K at a rate of 0.0083 K s\(^{-1}\); (iv) as for (iii) but (re-)heating at 0.167 K s\(^{-1}\) interrupted by an isothermal step. Data was coupled with hardness measurements and demonstrates that the re-heating conditions from 77 K significantly influence the fraction of austenite retained at the end of the thermal cycle.