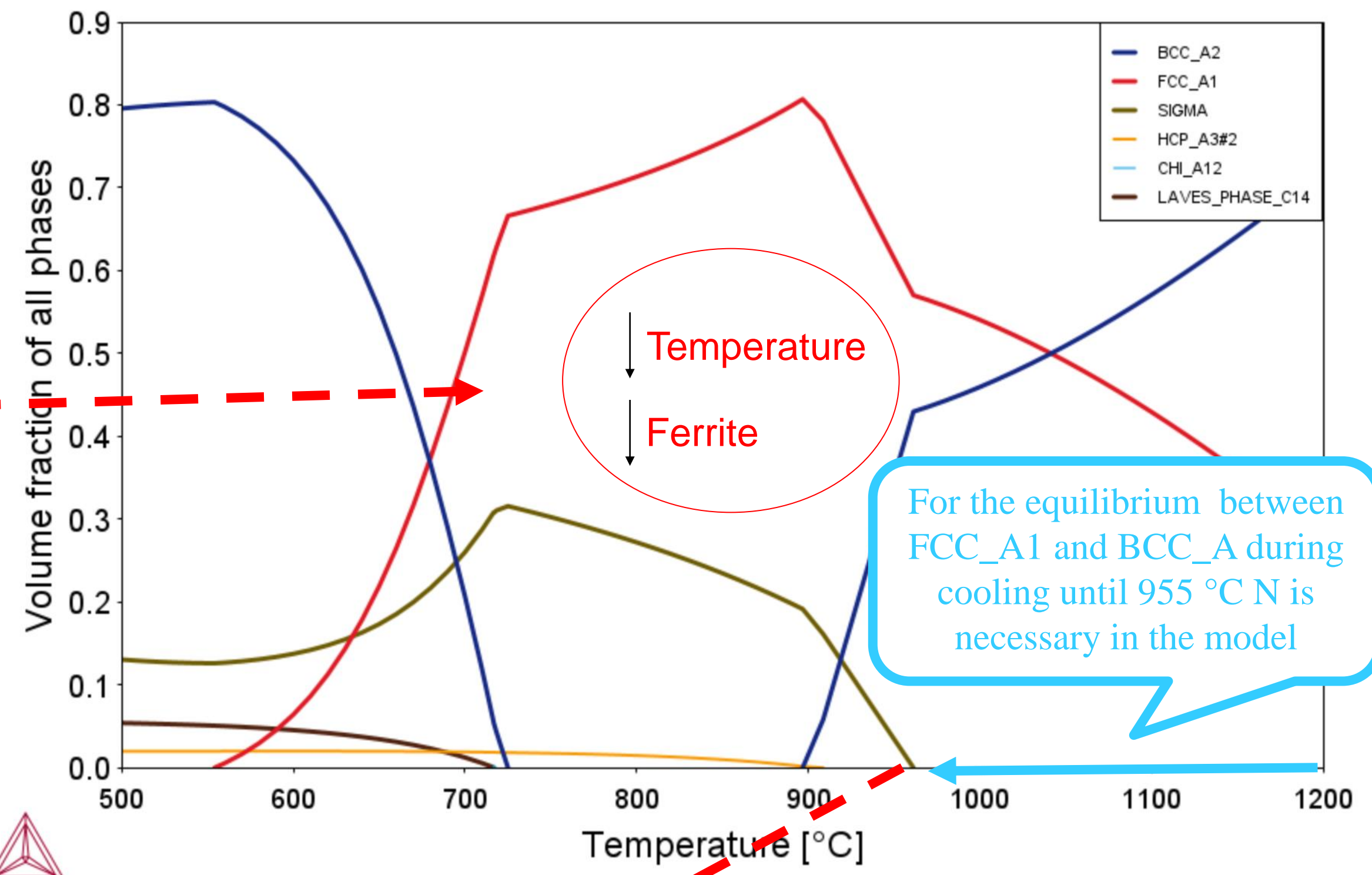
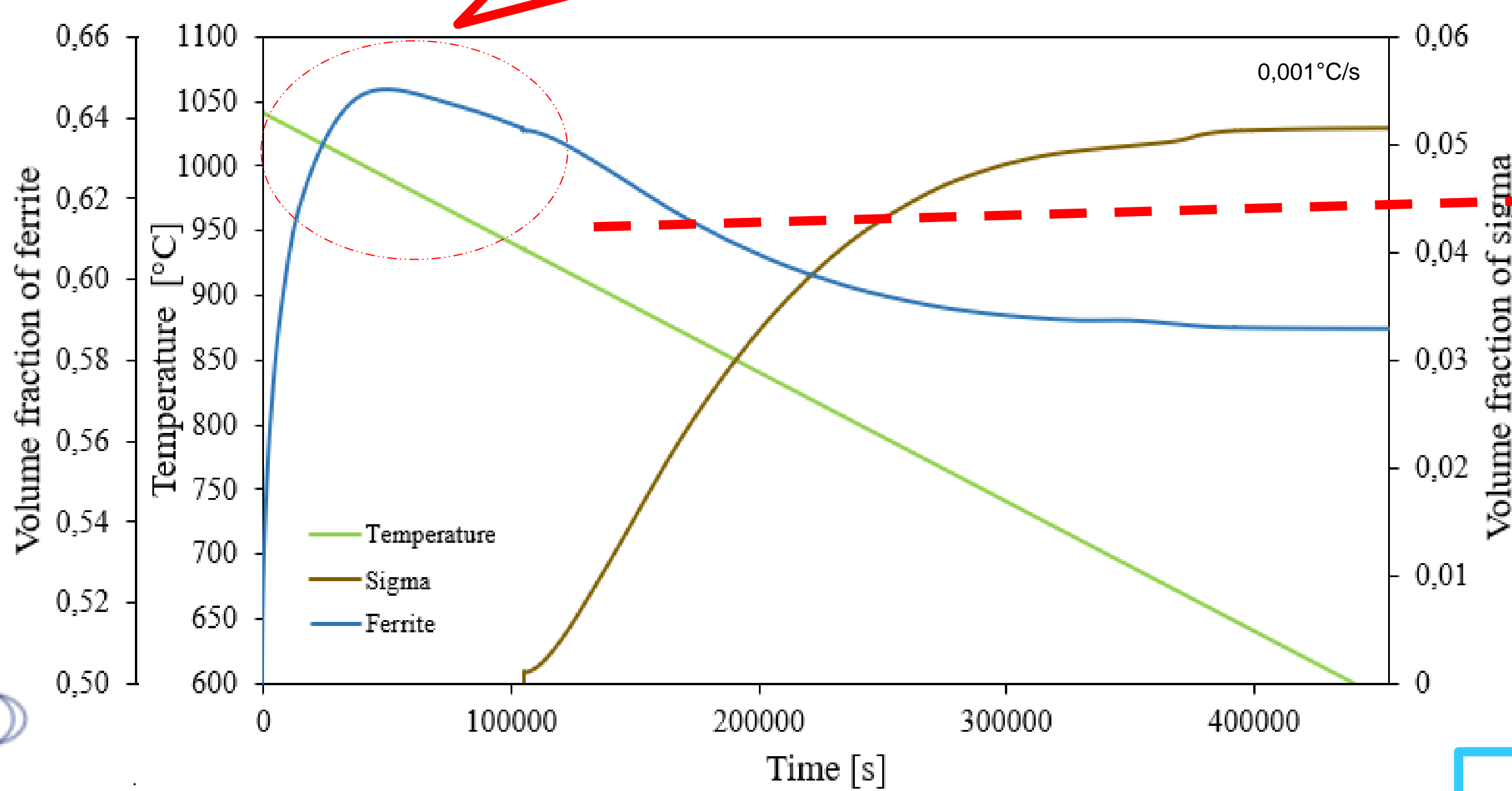


The development of CCT diagrams by computer simulation can be solution for the difficulty of obtaining them experimentally.

The present work developed CCT curves using DICTRA®. TCFE9 database for thermodynamic data and MOBFE4 for mobility data were used, aiming the study of sigma formation during cooling from solution-treatment temperature in duplex stainless steels. The simulations were applied to a UNS S31803 duplex stainless steel and were obtained by dividing the cooling into two stages.

Why two simulation stages?

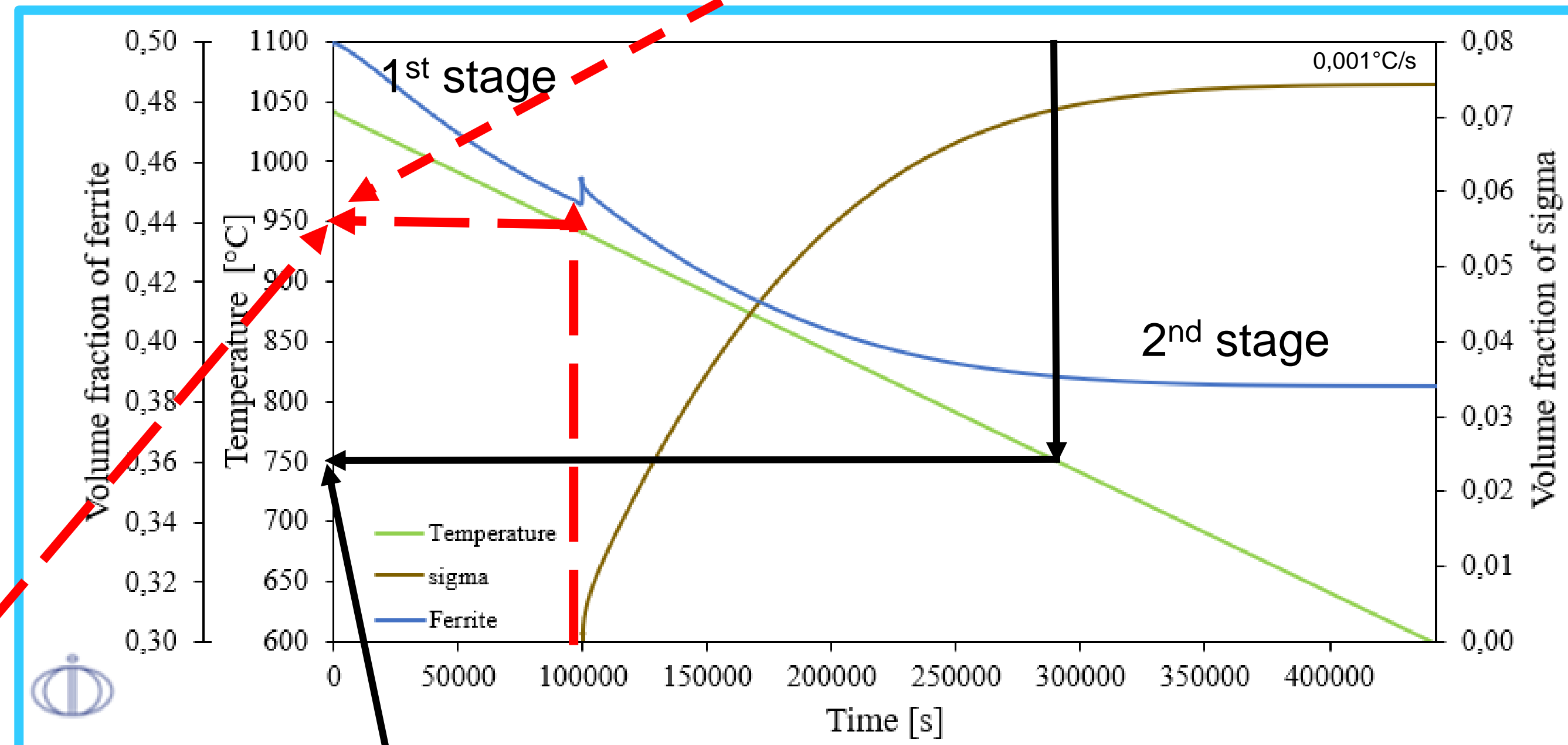


For the equilibrium between FCC\_A1 and BCC\_A during cooling until 955 °C N is necessary in the model

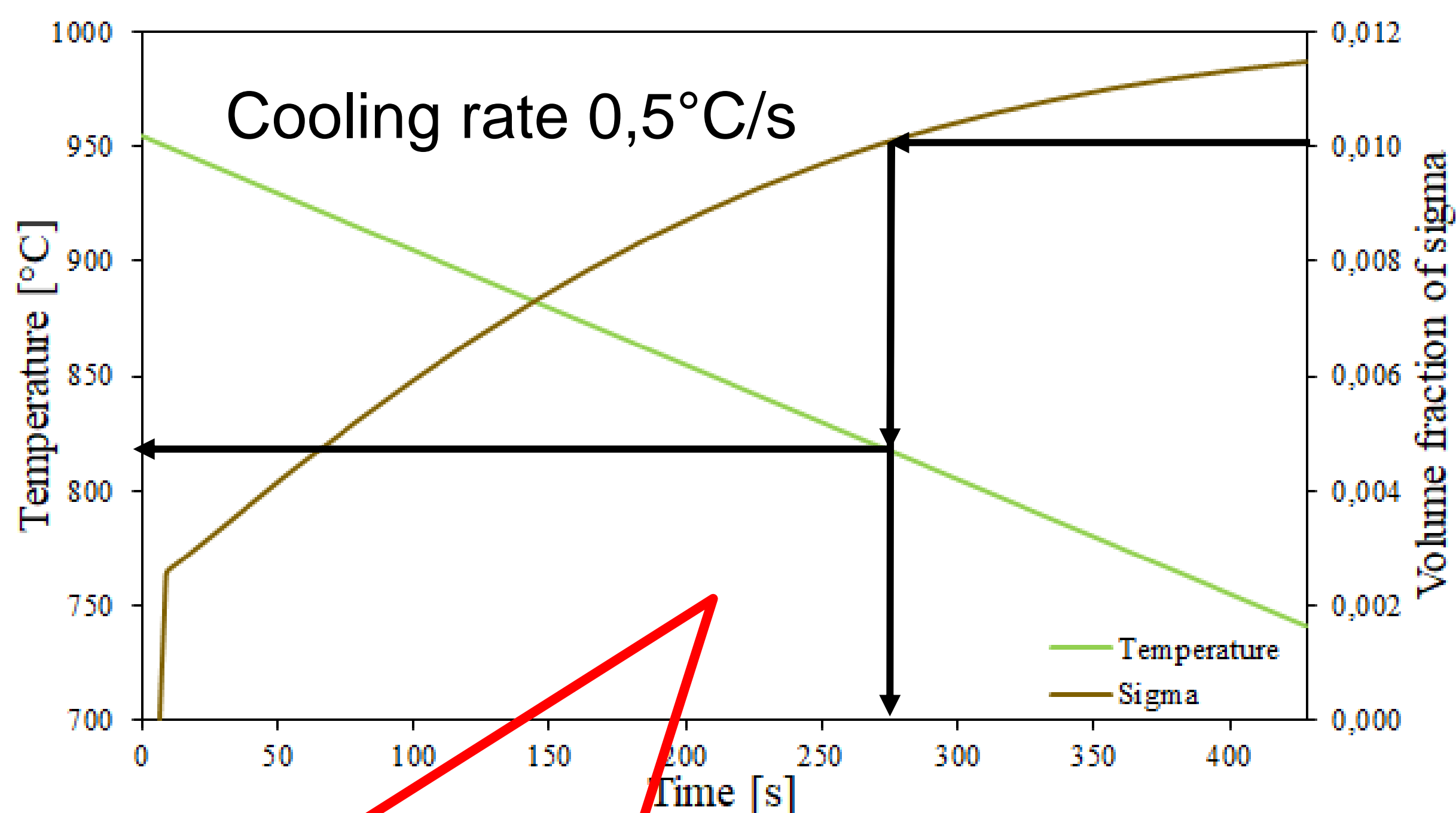
Cooling in one step without the presence of N causes destabilization of the austenite, increasing the fraction of ferrite during cooling prior to sigma formation, which is not observed experimentally.

### SOLUTION

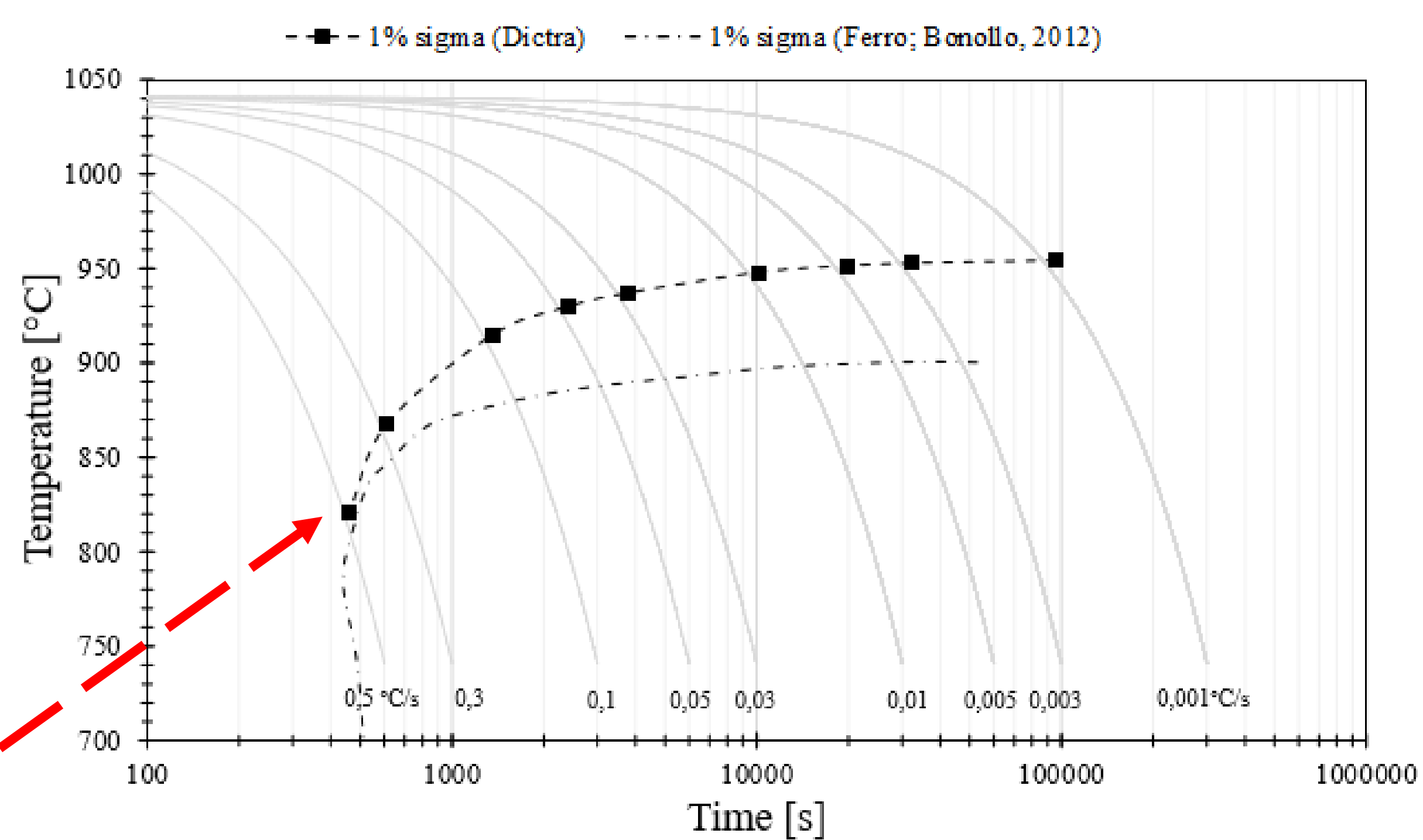
1<sup>st</sup> stage with nitrogen  
Sigma phase formation start temperature  
2<sup>nd</sup> stage without nitrogen



Phases stabilization at 750°C



interpolation of time and temperature for 0,01 volume fraction of sigma formed in a given cooling rate corresponds to a point of the CCT



Literature data were simulated in DICTRA® and the curves were compared: results show that critical cooling rates for sigma formation can be well described.

### Reference

P. Ferro; F. Bonollo. *Met. Mat. Trans. A.* 43A (2012) 1109-1116.

### Biographical Note

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