The growth of acicular ferrite in Fe-Mn

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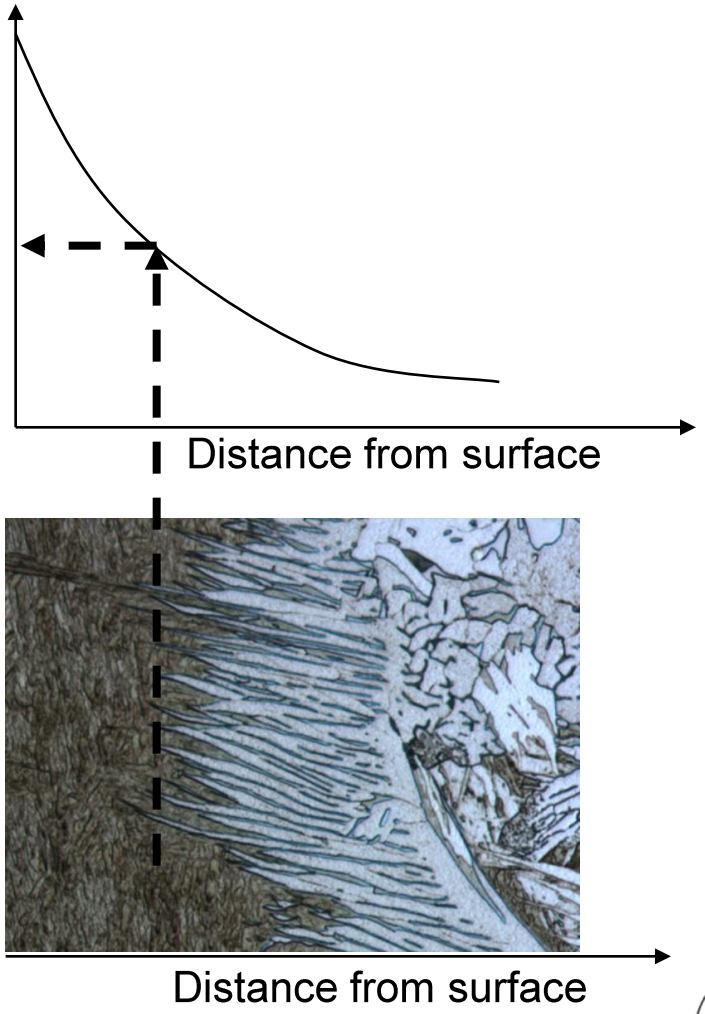
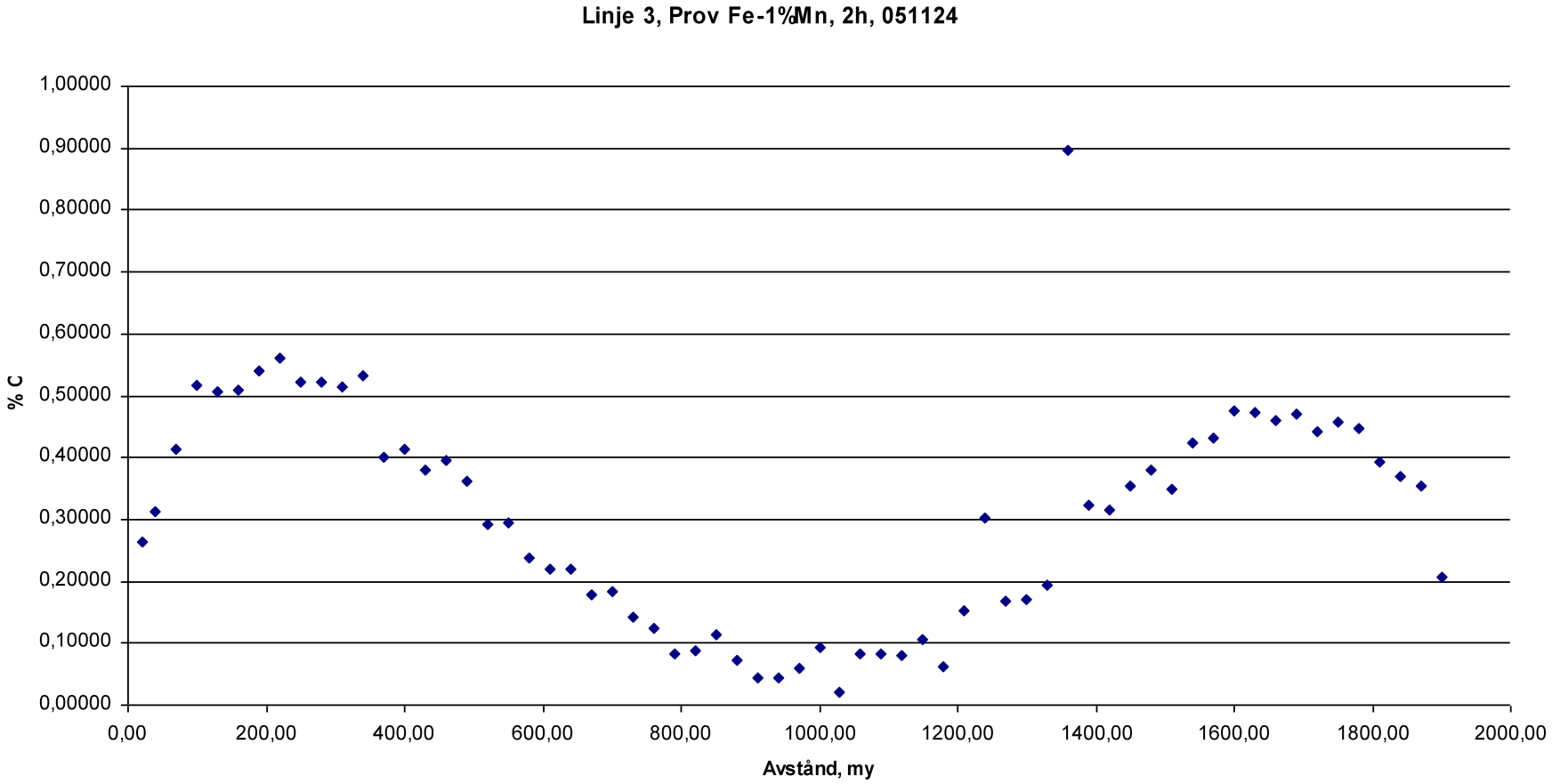
Experimental work

- Fe - 0.92, 1.81, 3.67, 5.54, 7.60 mass% Ni
- Fe – 0.99, 1.98, 3.92, 5.66 mass% Cr
- Fe – 0.71, 1.69, 2.60, 5.46 mass% Mn
- Fe - 0.27, 0.51, 1.00, 2.00 mass% V
- Fe - 0.5, 0.99, 2.01, 3.01 mass% Mo
- Carburized
- Isothermal heat treatment
- Microstructure studied by LOM
- Measurements of the composition gradients with ASEM

The gradient technique



Measurement of the carbon gradient with ASEM



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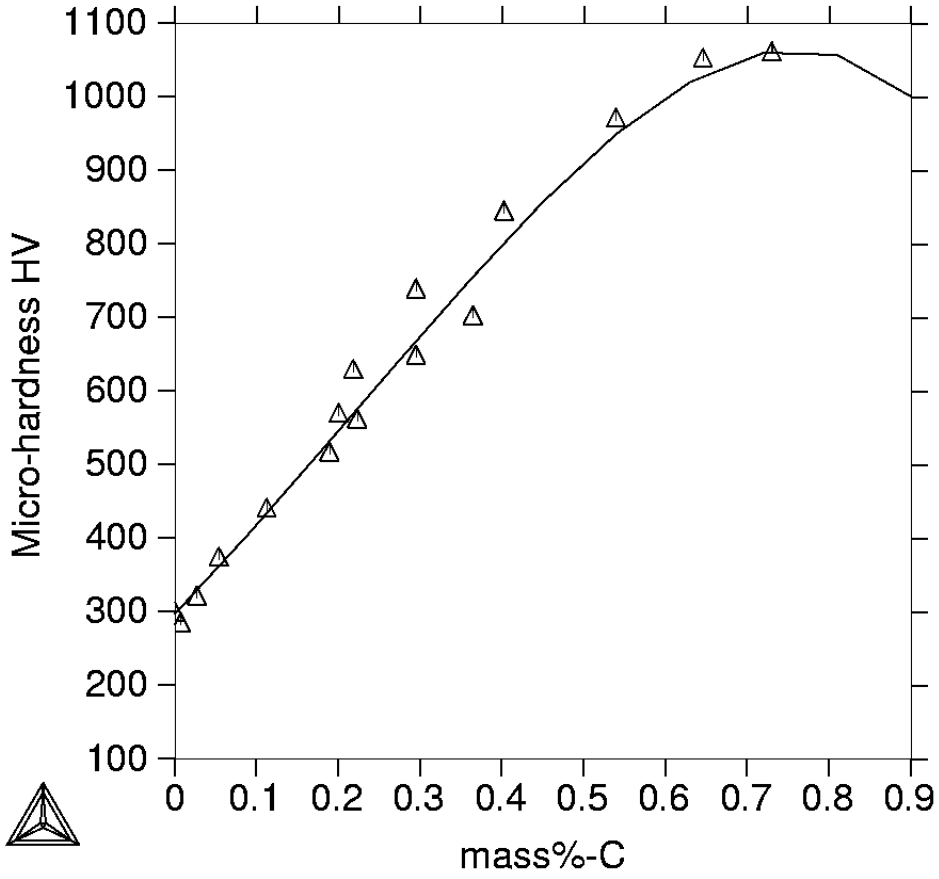
Correlation between micro-hardness and carbon content for 2% Mn



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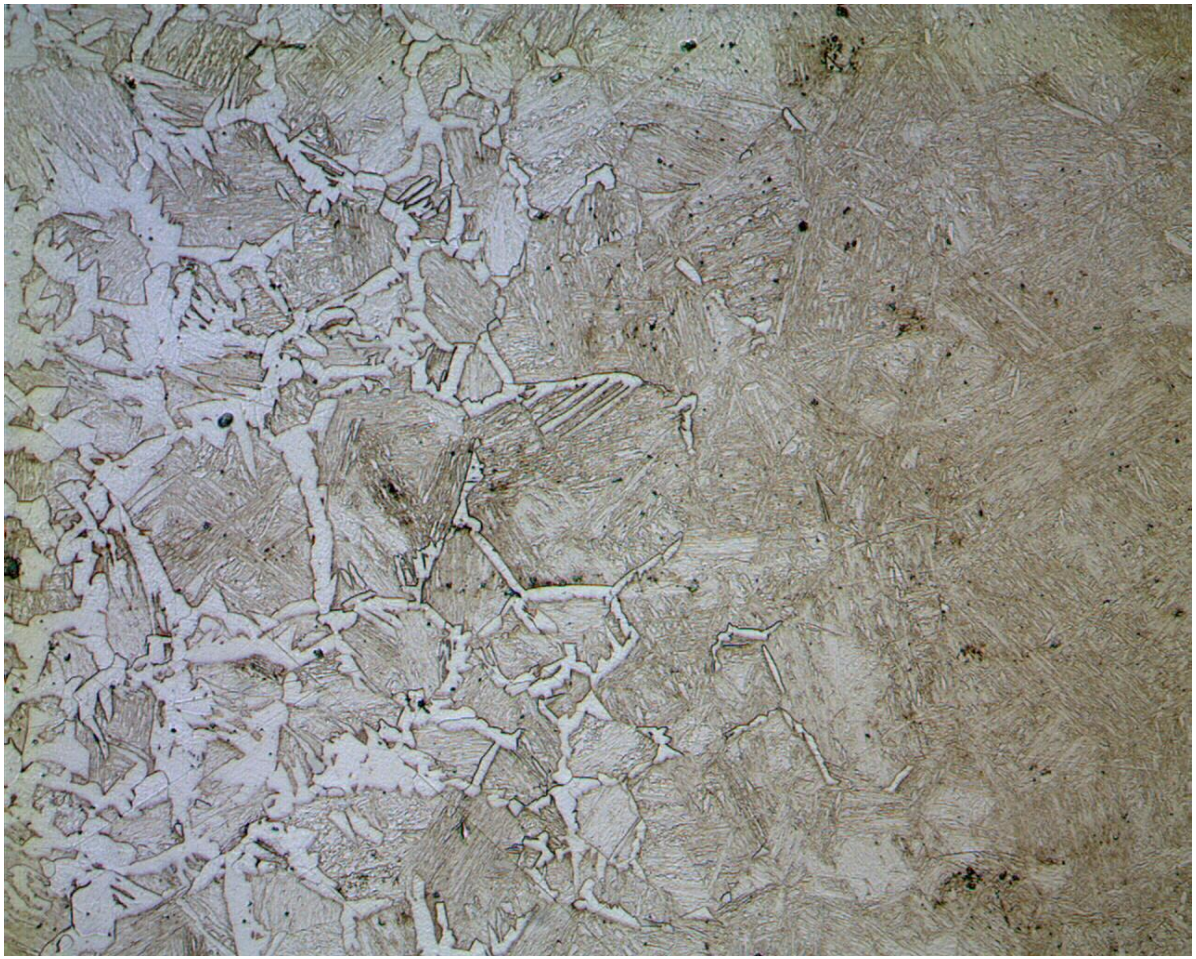
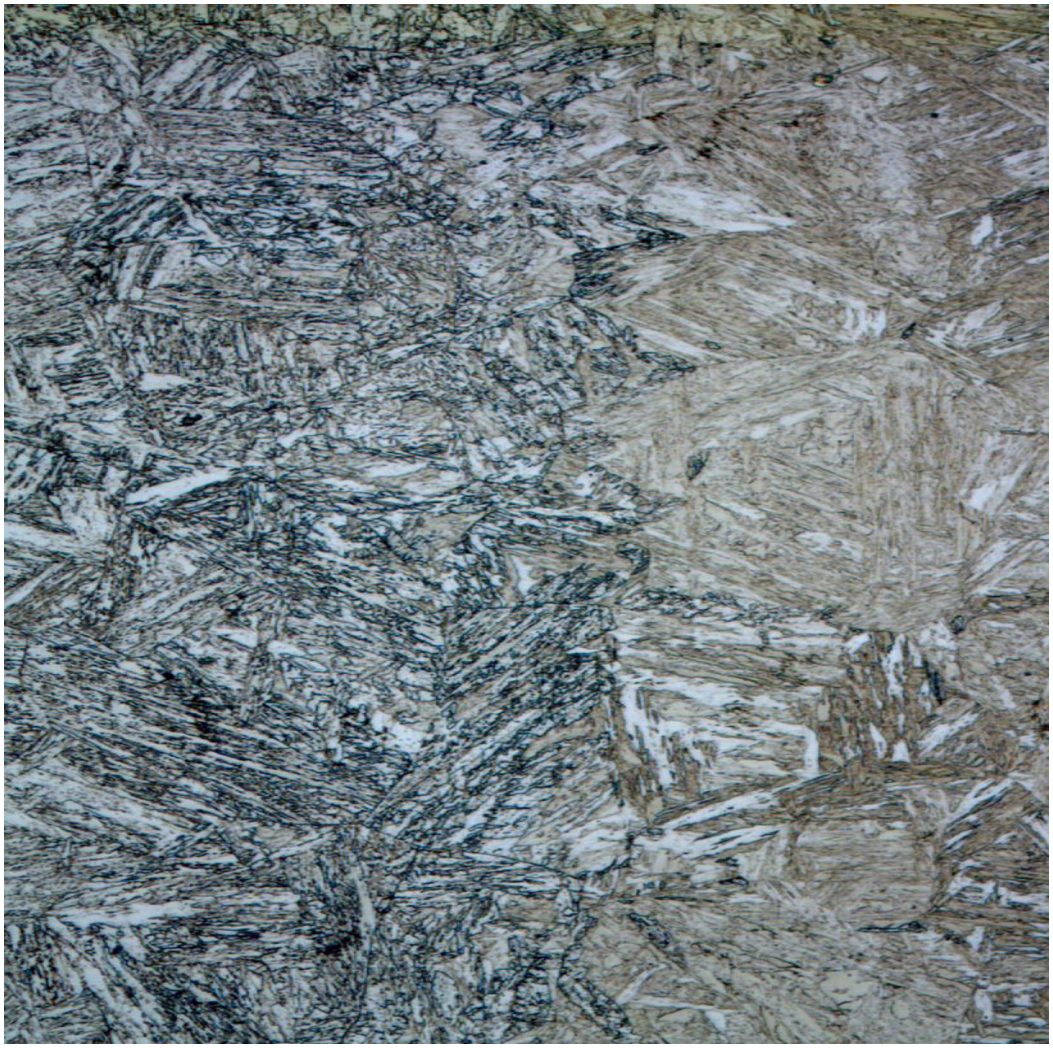
1%Mn 725°C



6% Mn 350°C



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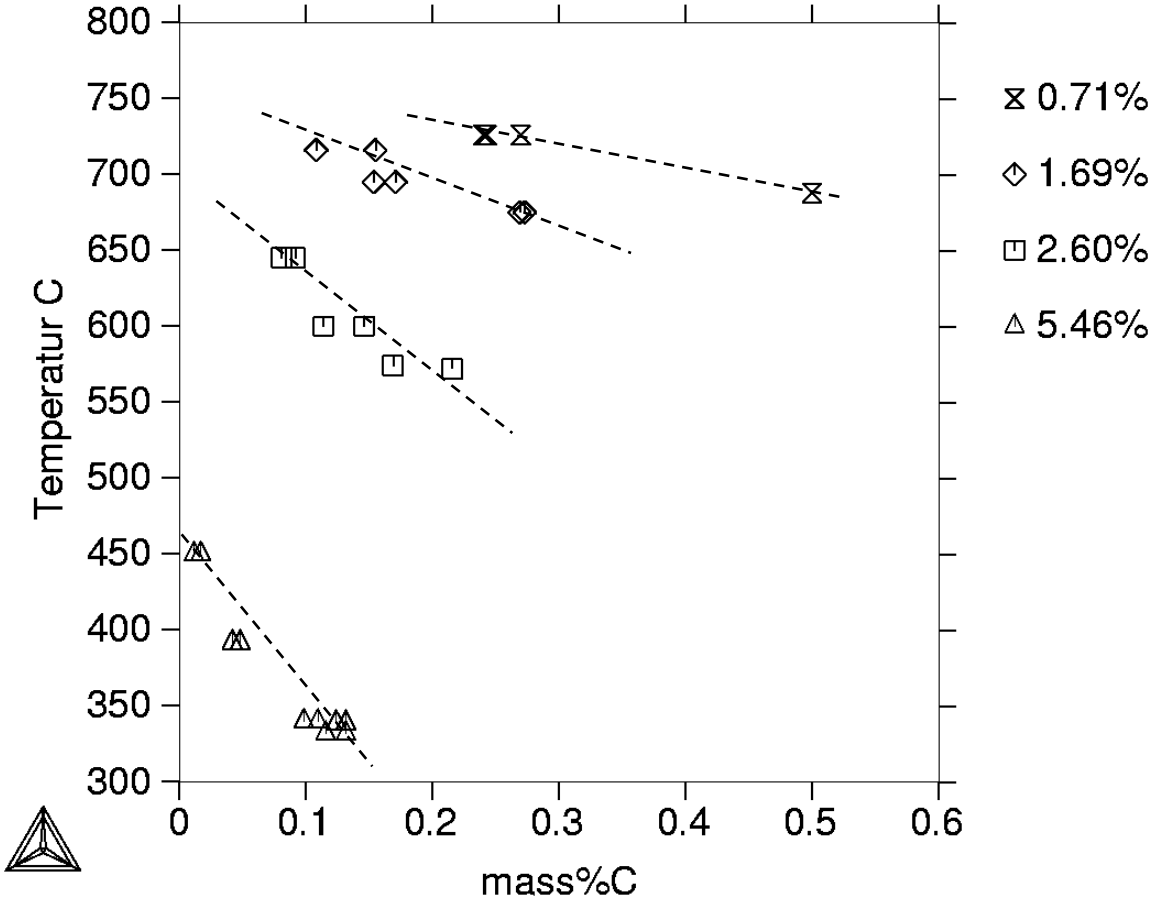
Temperature as function of critical carbon content in Fe-Mn alloys

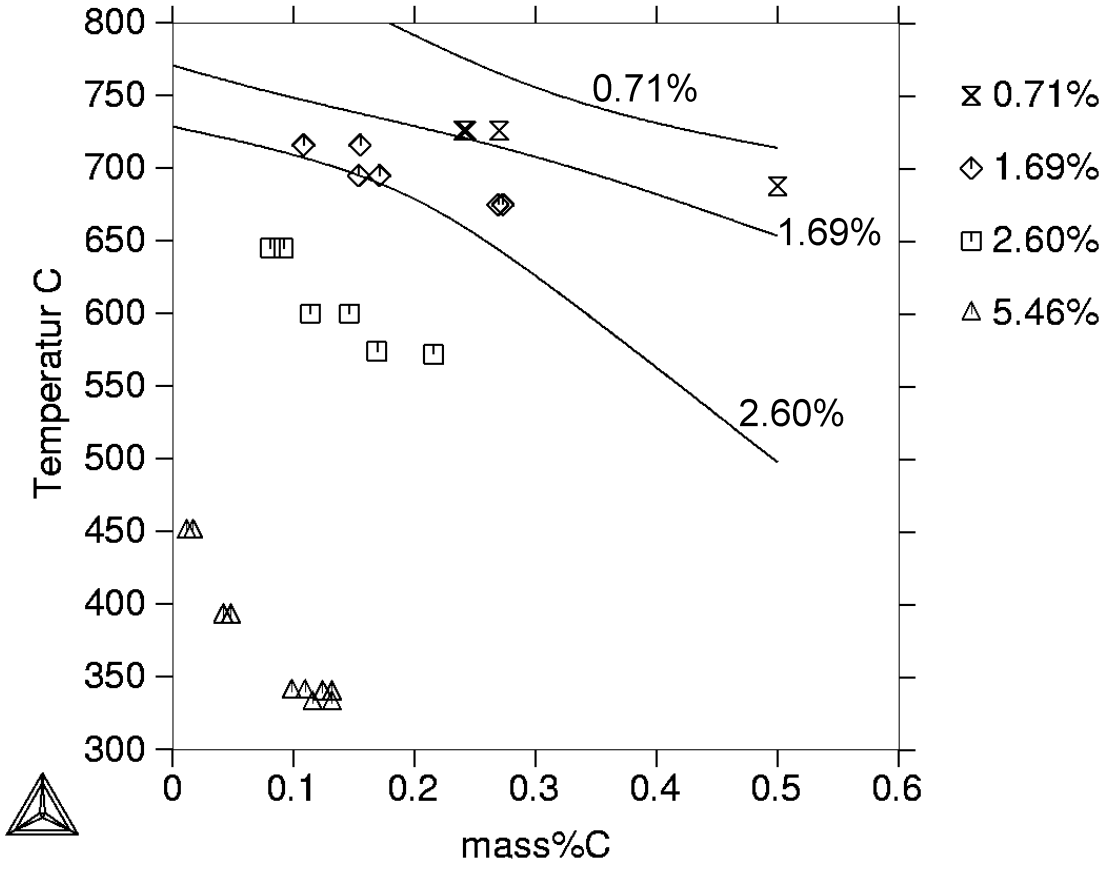


One model for lengthening of Widmanstätten ferrite, upper bainite and lower bainite

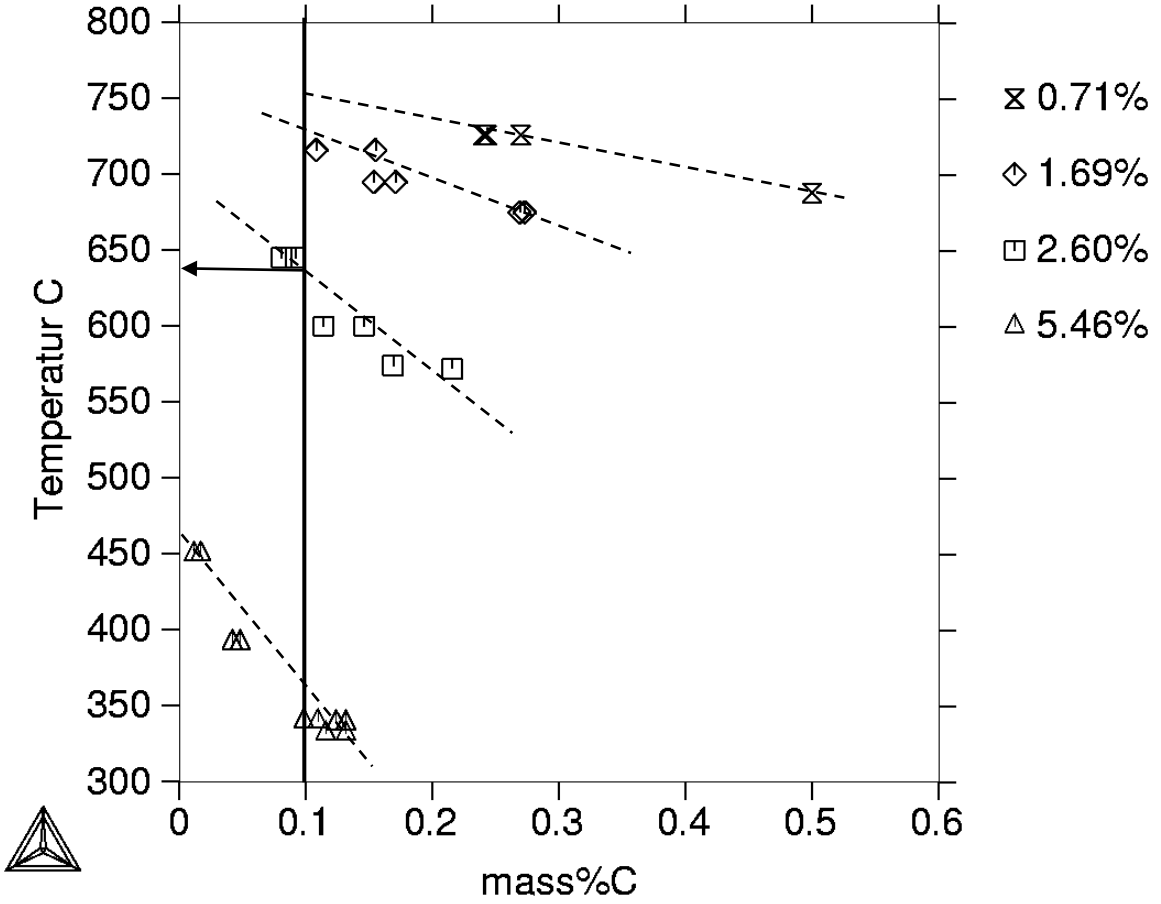
Growth controlled by:

- Constant thermodynamic barrier
- Carbon diffusion
- Paraequilibrium conditions

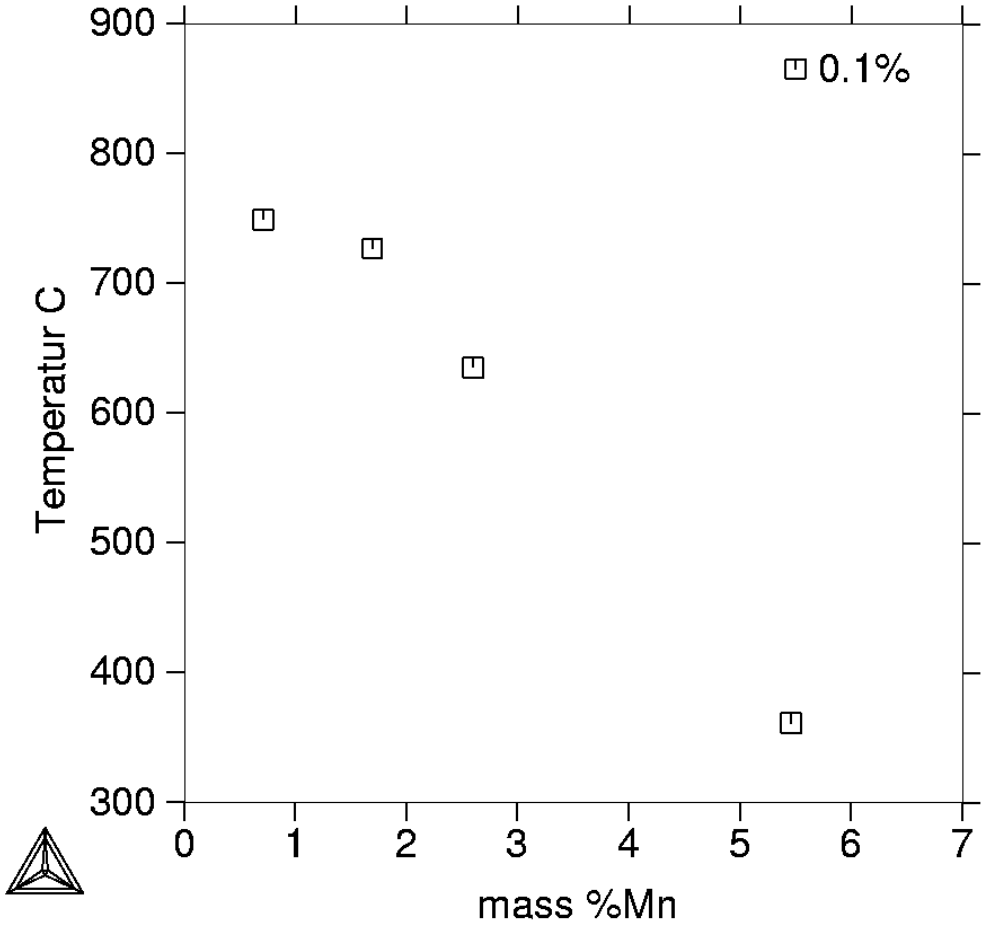
Comparison of experimental data with WB_s



Critical temperature for Fe-Mn alloys with 0.1 mass% C



Critical temperature as function of Mn content for Fe-Mn alloys with 0.1 mass% C



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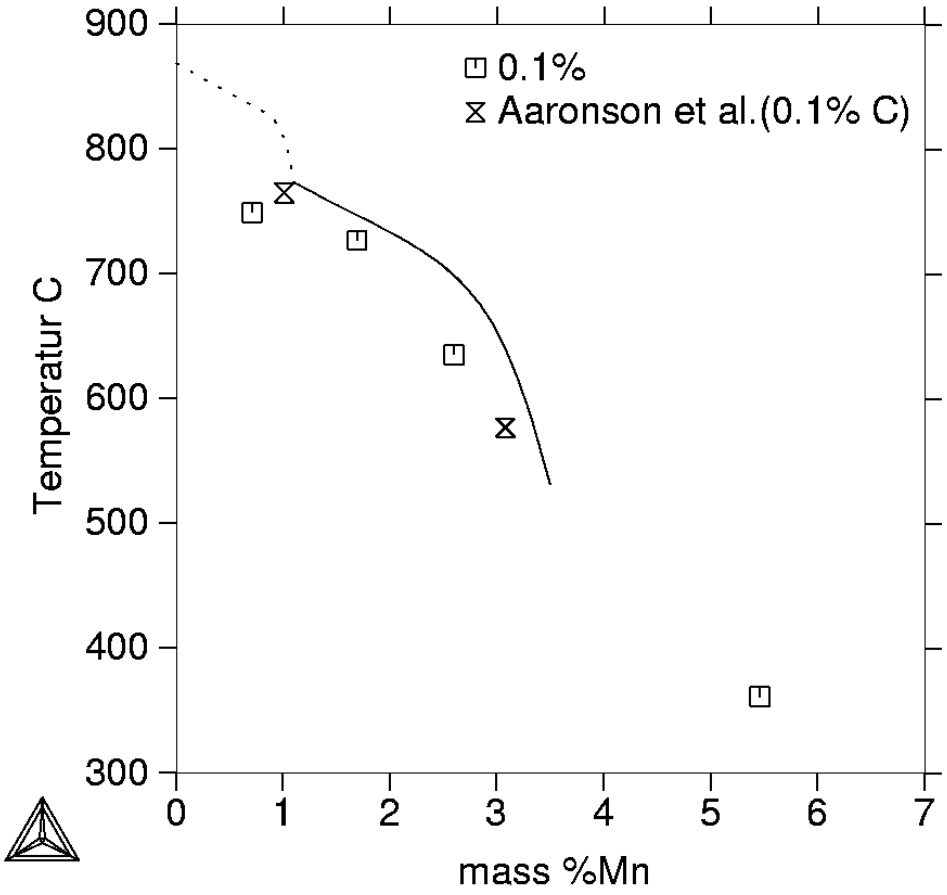
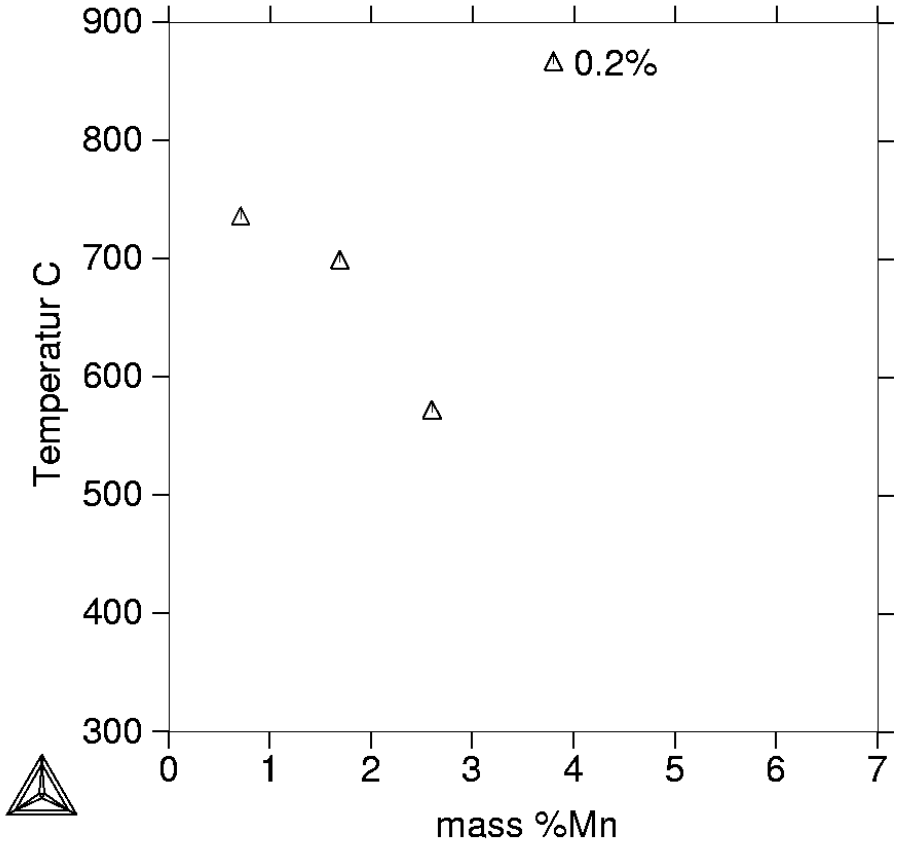
Critical temperature as function of Mn content for 0.1 mass% C compared with WB_s calculation



Critical temperature as function of Mn content for Fe-Mn alloys with 0.2 mass% C



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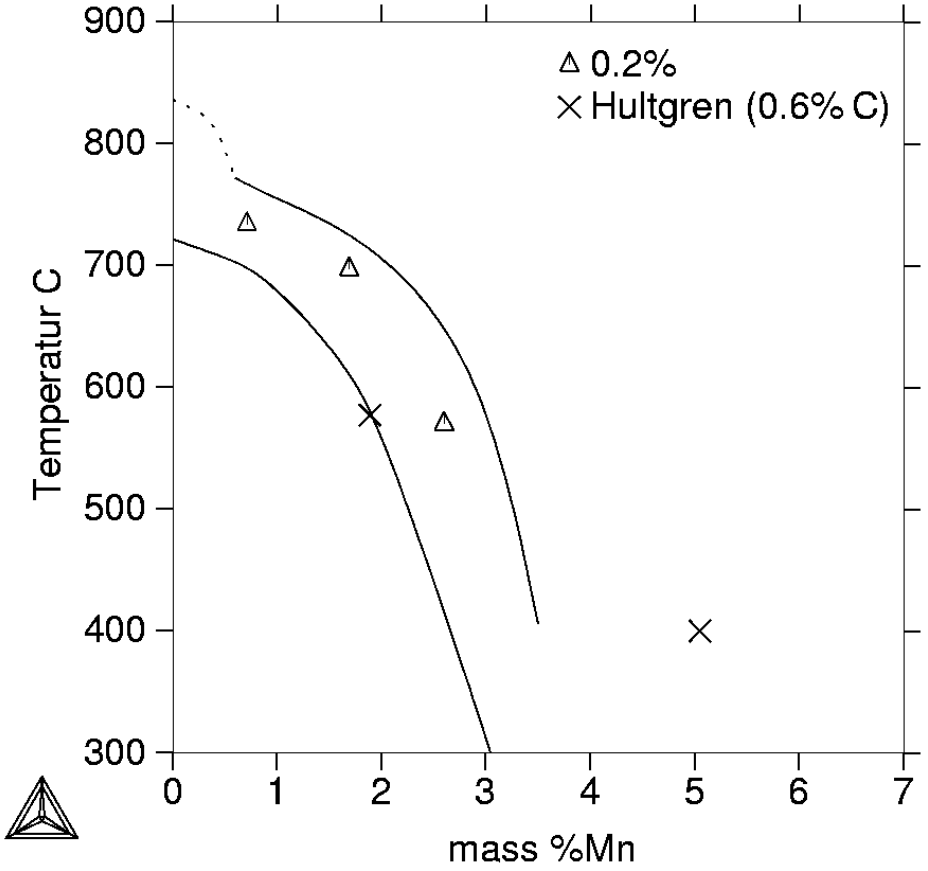
Critical temperature as function of Mn content for 0.2 and 0.6 mass% C compared with WB_s calculation



The themodynamic barrier