Thermodynamic modelling of the Al–Co–Fe system

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Objectives
- Model the Al-Co-Fe system using experimental data in the literature.
- Optimize the ternary magnetic ordering and interaction parameters in the Al-Co-Fe.
- Include the Al-Co-Fe ternary system in the high entropy alloy thermodynamic database to give a reliable calculation.

Methodology

Thermodynamic modelling of the Al–Co–Fe system

• A thermodynamic description of the Al–Co–Fe is proposed.
• Various isothermal and vertical sections were calculated and compared with the literature. A good agreement between them is achieved.
• Liquidus surface of the system over the whole composition is calculated.
• The Al-Co-Fe ternary system is modelled using Calphad method.

Results: Liquidus surface of Al–Co–Fe

- Liquidus surface of the system over the whole composition is calculated.
- Various isothermal and vertical sections were calculated and compared with the literature. A good agreement between them is achieved.
- A thermodynamic description of the Al-Co-Fe is proposed.

Vertical section at 40 at.% Fe with experimental data from Kamiya et al. [7] and Ackermann [5].

Calculated Al–Co phase diagram from Ostrowska and Cacciamani [1].

Calculated Co–Fe phase diagram from Ohnuma et al. [3].

Calculated Al–Fe phase diagram from Zheng et al. [2].

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References