

Article

Solidification and Precipitation Microstructure Simulation of a Hypereutectic Al–Mn–Fe–Si Alloy in Semi-Quantitative Phase-Field Modeling with Experimental Aid

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1. Construction design details of the casting mold

In order to record the temperature during the solidification process, Type-K thermocouples were placed in the mold where the location marked with the red boxes in Figure S1.

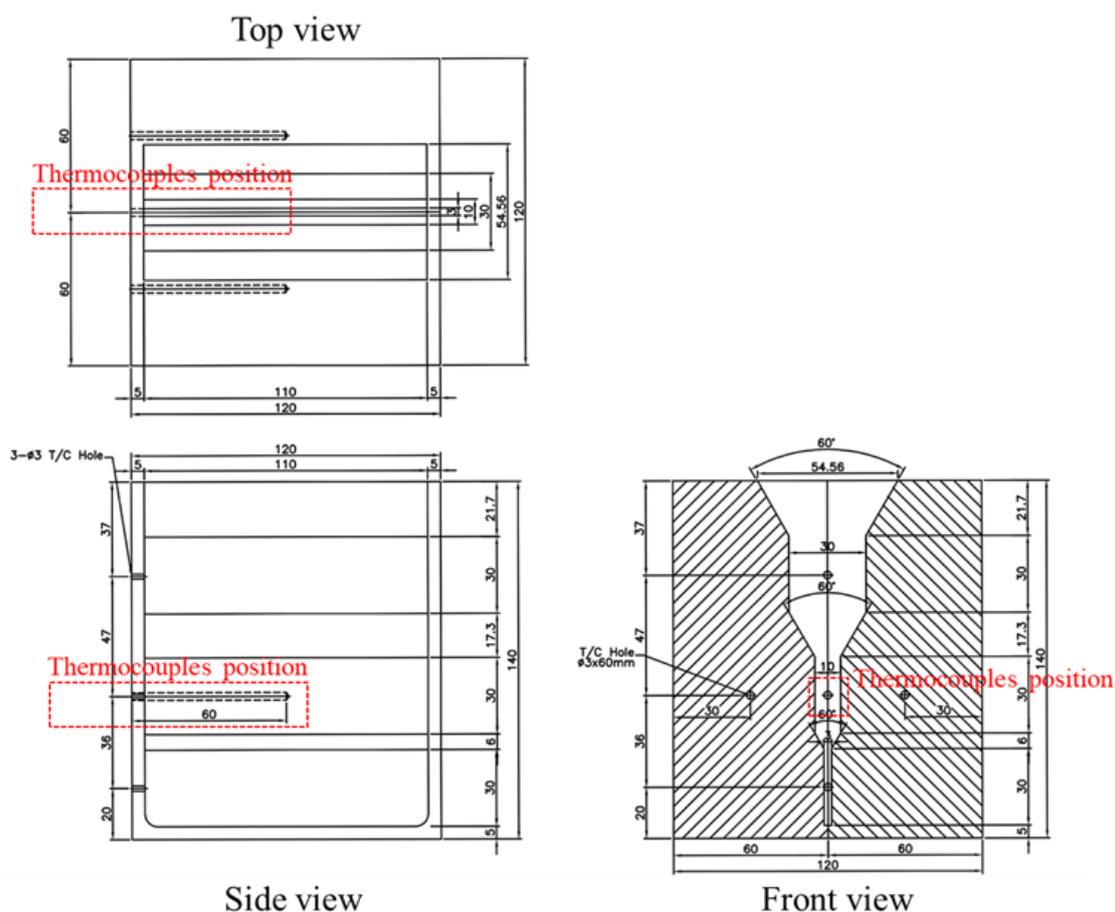


Figure S1. Construction design details of the casting mold.

2. Simulation scheme

The phase-field simulations were conducted in the following scheme:

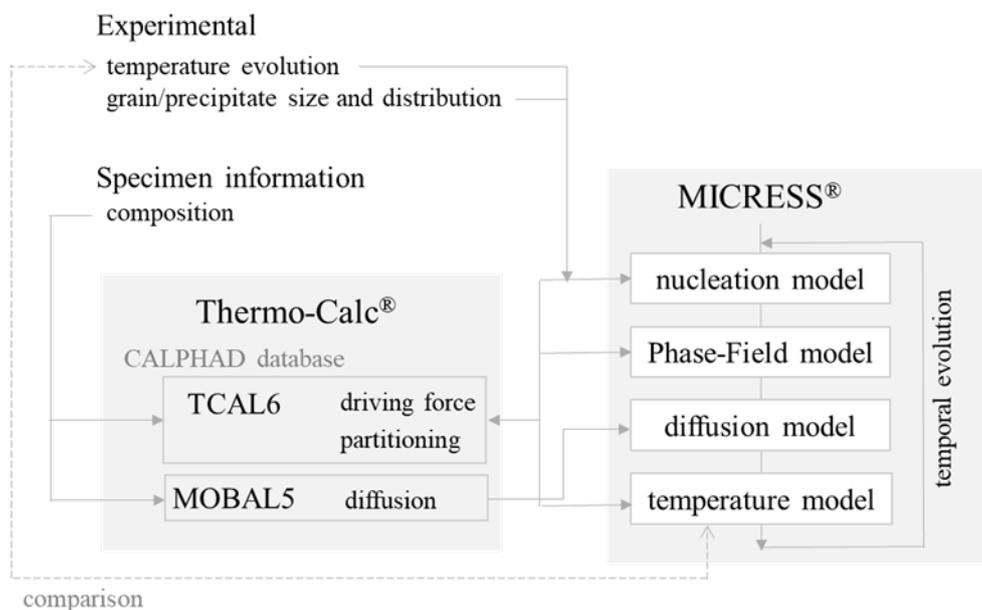


Figure S2. Simulation scheme.

3. Precipitates evolution in simulation

Figure S3 shows the precipitate size distribution from 2D phase-field simulation when the solidification was completed. Precipitate distribution mainly consists of large primary precipitates (marked in dashed red line) and small interdendritic precipitates (marked in dashed blue line).

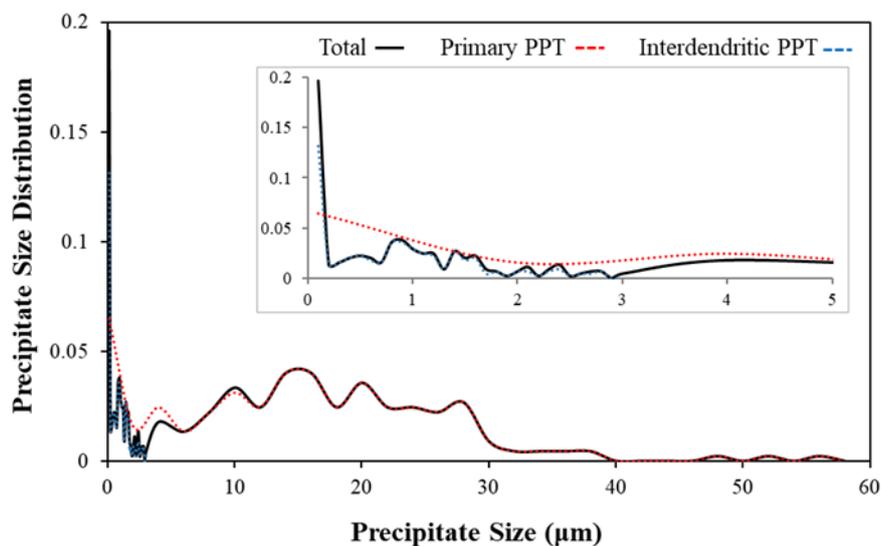


Figure S3. Precipitate size distribution at the end of simulation ($t = 11.2$ s, $T = 920$ K).