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Influence of solute elements (Sn and Al) on microstructure evolution of Mg alloys: an experimental and simulation study

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Abstract

Wedge casting technique was employed for binary Mg alloys to obtain the solidified microstructure with the cooling rates ranging from 5 to 150 K/sec. Microstructural features such as secondary dendrite arm spacing (SDAS) and secondary phase fractions were experimentally determined. The experimental results of Mg-3.0, 6.0 and 9.0 wt. % Sn alloys were compared with Mg-Al alloys to understand the solute effect upon the evolution of SDAS and second phase fraction in Mg binary alloys. Solidification calculations that incorporate solute back diffusion, secondary arm coarsening, dendrite tip undercooling and is dynamically linked with accurate thermodynamic databases were performed for accurate analysis of the experimental results.

Keywords: A1.Solidification, A1. Segregation, A1. Diffusion, A1. Eutectics, A2. Wedge casting, B1. Metals.

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