

Relationship of Mg₂Si Phase-Content and Thermal Expansion Properties of Mg–Si and Mg–Si–Ca Alloys

© S. Wu, T. Guo, P. An, X. Zhou, S. Lü

State Key Lab of Materials Processing and Die & Mould Technology, Huazhong University of Science and Technology, Wuhan 430074, China

E-mail: ssw636@hust.edu.cn

Received: July 16, 2019

Revised: July 16, 2019

Accepted: July 25, 2019

The thermal expansion properties of Mg–*x*Si (*x* = 1 wt.%, 1.38 wt.%, 2 wt.%, 3 wt.%, and 4 wt.%) binary alloys and Mg–4Si–*y*Ca (*y* = 0.2 wt.%, 0.4 wt.%, 0.6 wt.%, 0.8 wt.%, and 1.0 wt.%) alloys over a temperature range of 25–300°C were systematically studied. The results show that the Mg–Si binary alloys consist of α-Mg and Mg₂Si phases. The volume fraction of Mg₂Si phase increases with the increase of Si content in Mg–Si alloys, from 30.72% to 46.50% when Si content increases from 1 wt.% Si to 4 wt.% Si. The coefficient of thermal expansion (CTE) of Mg–*x*Si binary alloys decreases with the increase of Mg₂Si volume fraction. The addition of Ca element to Mg–4Si alloys has an obvious modification effect on the Mg₂Si phase. When the Ca content increases constantly, the CTE of the Mg–4Si–Ca alloys increases at first, then it continues to decline. The mechanism is mainly related to the formation of the CaMgSi phase.

Keywords: Mg–Si alloy, Mg₂Si phase, modification, thermal expansion.

*Публикация материалов Конференции в настоящем номере завершена.
Продолжение в ФТТ № 1 за 2020 год.*