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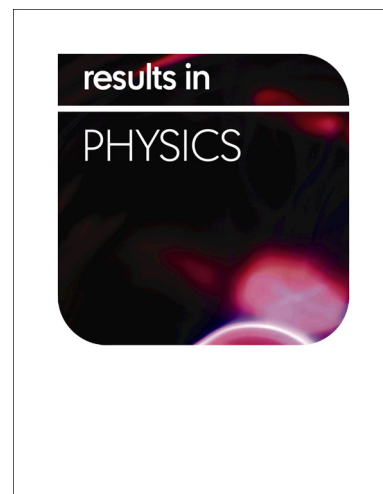
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Tong Gao, Zengqiang Li, Junhao Fa, Xiangfa Liu

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Preparation of a novel Mg–Fe master alloy and its spheroidizing effect on graphite in ductile irons

Tong Gao, Zengqiang Li, Junhao Fa, Xiangfa Liu*

Key Laboratory for Liquid–Solid Structural Evolution and Processing of Materials, Ministry of Education,

Shandong University, 17923 Jingshi Road, Jinan 250061, PR China

*Corresponding authors: E–Mail address: xfliu@sdu.edu.cn (Xiangfa Liu)

Abstract:

Spheroidizing treatment is of crucial importance for producing ductile irons. A novel Mg–Fe master alloy has been achieved through the recycling procedure of Al–Si–Fe alloys in this paper. The alloy of Mg–50Fe–16Al–8Si with amounts of block–like $\text{Al}_2\text{Fe}_3\text{Si}$ particles was synthesized by adding Al–14Si–2Fe alloy into Mg melt. It was found that the Mg–Fe master alloy exhibits attractive spheroidizing performance on a ductile iron Q10. This work confirms the significance for achieving Mg–Al and Mg–Fe alloys simultaneously through recycling Al–Si–Fe alloys.

Keywords: Mg–Fe master alloy; ductile iron; spheroidizing; graphite particles

1 Introduction

The concept of energy saving and materials recycling is widely accepted nowadays [1]. Producing primary electrolytic Al is energy consuming and environment damaging whereas the recycling and reusing of scrap Al is promising [2]. Fe, as an impurity, is common in Al–Si alloys and prefers to form brittle $\beta\text{-Al}_5\text{SiFe}$ intermetallic compounds, which is quite harmful for the mechanical properties [3, 4]. Based on the theory to modify $\beta\text{-Al}_5\text{SiFe}$ or to remove the intermetallic, the methods by overheating the melt, adding neutralized elements, centrifugal separation, and electromagnetic separation have been investigated for decades [5–8]. In our recent

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