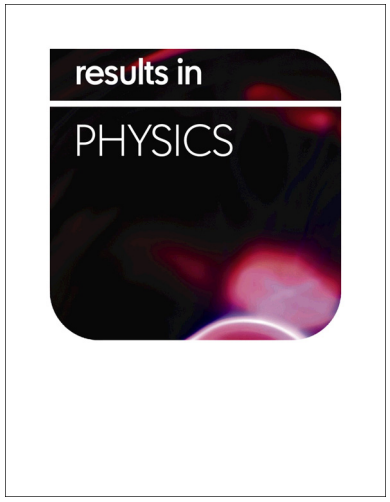

Preparation of a novel Mg–Fe master alloy and its spheroidizing effect on graphite in ductile irons

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

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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 Al_2Fe_3Si 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 β–Al_5SiFe intermetallic compounds, which is quite harmful for the mechanical properties [3, 4]. Based on the theory to modify β–Al_5SiFe 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