Pengaruh Penambahan Unsur Gd dan Variasi Laju Pendinginan Terhadap Mikrostruktur (Fasa Intermetalik Beta, Silikon Eutektik, dan SDAS) Paduan AlFe7Si = The Effect of Gd Addition and Variation of Cooling Rate on AlFe7Si Alloy Microstructure (Beta Intermetallic Phase, Eutectic Silicon and SDAS)

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Abstrak

Fase intermetalik beta yang terbentuk dalam paduan aluminium-silikon memiliki efek merusak pada sifat mekaniknya. Untuk meningkatkan sifat mekaniknya, teknik penyempurnaan dan modifikasi Î²-Al5FeSi dan Si eutektik digunakan. Studi ini meneliti efek penambahan gadolinium (Gd) dengan penambahan 0%, 0,3%, 0,6%, dan 1,0% pada karakteristik mikrostruktur paduan AlFe7Si. Penelitian ini menggunakan optical emission spectrocopy, optical microscopy, scanning electron microscopy, energy diffraction spectrum, dan simultaneous thermal analysis. Hasil penelitian menunjukkan bahwa penambahan Gd dapat mengurangi ukuran fasa Î²-Al5FeSi serta fasa silikon eutektik dan meningkatkan morfologinya. Penambahan 0,6% berat Gd menunjukkan efek terbaik pada pengurangan fase Î²-Al5FeSi dan fasa silikon eutektik. Secondary dendrite arm spacing (SDAS) juga tereduksi dengan penambahan Gd. <hr /> Beta intermetallic phases formed in the aluminium-silicon alloys has a detrimental effect on their mechanical properties. To improve its mechanical properties, the refinement and modification techniques of Î²-Al5FeSi and Si eutectic were used. The current study investigated the effects of gadolinium (Gd) addition (0, 0.3, 0.6, and 1.0 wt%) on microstructural characteristics of AlFe7Si alloy. It was studied by means of optical emission spectrocopy, optical microscopy, scanning electron microscopy, energy diffraction spectrum and simultaneous thermal analysis. The results showed that the addition of Gd obviously reduced the sizes of the Î²-Al5FeSi phase as well as eutectic silicon phase and improved their morphologies. The addition of 0,6 wt% Gd shows the best effect on reducing the Î²-Al5FeSi phase and eutectic silicon phase. The secondary dendrite arm spacing is also reduced by the addition of Gd.