

A Study on the Fluidity of Hybrid Aluminum-matrix Composite (AMC/SiCp/Gr.)

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ABSTRACT

ABSTRACT The purpose of this study is to investigate the effect of process and metallurgical parameters on the hybrid aluminum matrix composites AMC/SiCp/Gr. which used three types of aluminum alloys A356.2, A413.1 and A390.1 as matrix alloys. The reinforcement materials are silicon carbides particles (SiCp) and graphite particles (Gr.) which their sizes are micrometer order. The fluidity measurements are conducted by using CO₂ sand mold method and spiral fluidity test pattern. In addition, the computer-added cooling curve analysis method (CA-CCA) was utilized to evaluate the effects of solidification temperature and solidification time on the fluidity of the three types of hybrid aluminum composites. The latent heat and the solid fraction change during the flow and solidification in the cavity are also calculated by CA-CCA method. The data show significant influence on the fluidity of the composites. The results of this research indicate that the fluidity of aluminum added with graphite particles composites was firstly increased with the increase amounts of graphite for the AMC/Gr. composites and then was decreased with the increase amounts of graphite. The best fluidity occurred at four weight percent(4wt.%) graphite added amount. However, the fluidity was gradually decreased with the increase of silicon carbide amounts for the hybrid AMC/SiCp/Gr. composite. The CA-CCA analyses find that the solidification temperatures increase and latent heat decreases and the solidification time increases firstly and then decreases with the increase amounts of graphite for the AMC/Gr. composites. But, the solidification temperatures increase and latent heat and solidification time decrease with the increase amounts of silicon carbide for the AMC/SiCp/Gr. composites. Finally, the microstructure observations about the spiral fluidity test castings of AMC/Gr. and hybrid AMC/SiCp/Gr. composites indicate that the fluidity was significantly affected by the solidification modes and the solid fraction change along the spiral fluidity test castings.

Keywords : Hybrid aluminum-matrix composite(AMC/SiCp/Gr.) ; Fluidity ; Graphite(Gr.) ; Silicon carbide(SiCp) ; CA-CCA

Table of Contents

目錄 封面內頁 簽名頁 授權書.....	iii	中文摘要.....	
.....v 英文摘要.....	vii	誌謝.....	
.....ix 目錄.....	x	圖目錄.....	
.....xiv 表目錄.....	xxi	符號說明.....	
.....xxiii 第一章 前言.....	1	第二章 文獻探討.....	
.....3 2.1 複合材料添加之基材與強化材.....	5	2.1.1 基材合金.....	
.....5 2.1.2 強化材的種類.....	6	2.2 製造金屬基複合	
材料的方法.....	6	2.2.1 粉末冶金製程.....	7
.....7 2.2.3 霧化共沉積法.....	7	2.2.2 熔體鑄造法...	
.....8 2.3 複合材料的潤濕性.....	8	2.2.4 擠壓鑄造法...	
動性.....	10	2.4 複合材料的流	
對流動性之影響.....	10	2.4.1 強化材顆粒含量對流動性之影響.....	10
.....10 2.4.3 孔洞對流動性之影響.....	11	2.4.2 澆注溫度	
強化材之生成反應物對流動性的影響.....	12	2.4.4 基材與	
材料之凝固冷卻曲線.....	13	2.5 複合材料流動性鑄件之顯微組織.....	12
.....13 第三章 實驗方法及步驟.....	31	2.6 複合	
實驗設計.....	31	3.1 流動性測試.....	31
3.1.2 複合材料之基材.....	31	3.1.1 流動性測試.....	31
.....32 3.1.4 澆鑄溫度.....	32	3.1.2 複合材料之強化材.....	
.....33 3.2.1 攪拌設備.....	33	3.1.3 複合材料之強化材.....	
.....33 3.2.3 螺旋型流動性測試砂模.....	33	3.1.4 澆鑄溫度.....	32
.....34 3.3.1 備料.....	34	3.2 實驗設備及裝置.....	
.....34 3.3.3 熔煉.....	34	3.2.1 攪拌設備.....	33
.....34 3.3.5 強化材顆粒之添加與攪拌.....	35	3.2.2 除氣處理.....	
.....35 3.4 流動性測試.....	35	3.2.3 螺旋型流動性測試砂模.....	33
		3.3 複合材料之熔煉與處理.....	
		3.3.1 備料.....	34
		3.3.2 強化材顆粒之預熱.....	34
		3.3.3 熔煉.....	34
		3.3.4 烘烤攪拌器.....	34
		3.3.5 強化材顆粒之添加與攪拌.....	35
		3.3.6 除氣處理.....	35
		3.4 流動性測試.....	35
		3.5 熱分析.....	

.....36	3.5.1 凝固冷卻曲線之量測.....	36	3.5.2 螺旋型鑄件流動之固相分率...
.....39	3.6 金相組織觀察與分析.....	39	3.6.1 光學顯微鏡(OM)觀察.....
.....39	3.6.2 掃描式電子顯微鏡(SEM)觀察.....	40	第四章 結果與討論.....
.....48	4.1 螺旋型流動性測試.....	48	4.1.1 鋁基石墨複合材料之流動性.....
.....48	4.1.2 三種混合式鋁基複合材料之流動性.....	49	4.1.3 過熱溫度(澆注溫度)對流動性之影響.....
.....51	4.2 鋁基混合式複合材料之熱分析結果.....	52	4.2.1 凝固潛熱對流動性之影響.....
.....52	4.2.2 凝固溫度和凝固時間對流動性之影響.....	54	4.2.3 凝固過程之固相分率對流動性的影響.....
.....57	4.2.4 流動過程中固相分率之變化對流動性的影響.....	59	4.3 添加Gr.顆粒對流動凝固模式和流動性之影響.....
.....62	4.3.1 A356/Gr.流動凝固模式和流動性之關係.....	62	4.3.2 A413/Gr.流動凝固模式和流動性之關係.....
.....64	4.3.3 A390/Gr.流動凝固模式和流動性之關係.....	65	4.4 添加SiCp/Gr.顆粒流動凝固模式和流動性之影響.....
.....67	4.4.1 A356/SiCp/Gr.流動凝固模式和流動性之關係.....	67	4.4.2 A413/SiCp/Gr.流動凝固模式和流動性之關係.....
.....69	4.4.3 A390/SiCp/Gr.流動凝固模式和流動性之關係.....	71	4.6 SEM觀察分析.....
.....73	第五章 結論.....	151	參考文獻.....
.....154	圖目錄 Fig. 2-1 Recent metal matrix composites for civil industry to develop.....	19	Fig. 2-2 Rotors used in the degas treatment.....
.....19	Fig. 2-3 Flow chart for composite fabrication by powder metallurgy.....	20	Fig. 2-4 Equipment of compocasting process.....
.....21	Fig. 2-5 Schematic illustrations of spray deposition equipment.....	22	Fig. 2-6 Schematic diagram showing the contact angle that describes wettability.....
.....23	Fig. 2-7 Schematic representation of the effect of SDA size on SiCp distribution during solidification.....	23	Fig. 2-8 Variation of permanent mold spiral fluidity lengths with temperature for aluminum A356 base alloy and A356 base composites containing 10, 15 and 20 vol.% SiCp.....
.....24	Fig. 2-9 Schematic illustration showing the evolution of the pores morphology during the solidification of unmodified A356 aluminum alloy.....	25	Fig. 2-10 Schematic diagram showing process of surface blister generation in die-casting.....
.....26	Fig. 2-11 Photomicrographs of A356-10vol%SiC-4vol%Gr composite showing particle distribution in an ingot (25mm dia x 150mm) after holding at 700C for 30 minutes.....	27	Fig. 2-12 Illustration of three possible models of eutectic formation in hypoeutectic Al-Si based alloys.....
.....28	Fig. 2-13 Heating and cooling curves and first derivative curve for the 319 alloy samples.....	29	Fig. 2-14 First derivative vs. temperature of the cooling curve for 319 alloy.....
.....30	Fig. 3-1 The spiral fluidity test pattern.....	43	Fig. 3-2 The schematic apparatus of the stirring machine.....
.....43	Fig. 3-3 The stirring rod and blade.....	44	Fig. 3-4 The apparatus of degassing treatment.....
.....44	Fig. 3-5 The spiral fluidity test(CO2 mold).....	45	Fig. 3-6 The flow chart of experiments.....
.....46	Fig. 3-7 The schematic illustrations of CA-CCA method.....	47	Fig. 3-8 The positions of thermocouples superimposed on the spiral fluidity casting.....
.....47	Fig. 4-1 Change in the fluidity as a function of Gr. amounts for A356/Gr., A413/Gr. and A390/Gr. composites at superheat T=90	83	Fig. 4-2 Change in the fluidity as a function of SiCp/Gr. amounts for A356/SiCp/Gr., A413/SiCp/Gr. and A390/SiCp/Gr. composites at superheat T=90
.....83	Fig. 4-3 Effect of superheat and Gr. amounts on the fluidity of A356/Gr. composites.....	84	Fig. 4-4 Effect of superheat and Gr. amounts on the fluidity of A413/Gr. composites.....
.....84	Fig. 4-5 Effect of superheat and Gr. amounts on the fluidity of A390/Gr. composites.....	85	Fig. 4-6 Effect of superheat on the fluidity of A356+4wt%Gr., A413+4wt%Gr. and A390+4wt%Gr.composites.....
.....85	Fig. 4-7 Effect of superheat and SiCp amounts on the fluidity of A356/SiCp/Gr. composites.....	86	Fig. 4-8 Effect of superheat and SiCp amounts on the fluidity of A413/SiCp/Gr. composites.....
.....86	Fig. 4-9 Effect of superheat and SiCp amounts on the fluidity of A390/SiCp/Gr. composites.....	87	Fig. 4-10 Effect of superheat on the fluidity of A356+10wt%SiCp +4wt%Gr., A413+10wt%SiCp+4wt%Gr. And A390+10wt%SiCp +4wt%Gr. composites.....
.....87	Fig. 4-11 The thermal analysis result for A356+4wt%Gr. composite.....	88	Fig. 4-12 The thermal analysis result for A356+10wt%SiCp +4wt%Gr. composite.....
.....88	Fig. 4-13 The thermal analysis result for A413+4wt%Gr. composite.....	89	Fig. 4-14 The thermal analysis result for A413+10wt%SiCp +4wt%Gr. composite.....
.....89	Fig. 4-15 The thermal analysis result for A390+4wt%Gr. composite.....	90	Fig. 4-16 The thermal analysis result for A390+10wt%SiCp +4wt%Gr. composite.....
.....90	Fig. 4-17 A comparison of eutectic temperature and temperature of end solidification for A356/Gr., A413/Gr. and A390/Gr. composites.....	91	Fig. 4-18 A comparison of the solidification time for A356/Gr., A413/Gr. and A390/Gr.composites.....
.....91	Fig. 4-19 A comparison of eutectic temperature and temperature of end solidification for A356/SiCp/Gr., A413/SiCp/Gr. and A390/SiCp/Gr. composites.....	92	Fig. 4-20 A comparison of the solidification time for A356/SiCp /Gr., A413/SiCp/Gr. and A390/SiCp/Gr. composites.....
.....92	Fig. 4-21 A comparison of solid fraction (fs) and solidification temperature for A356+4wt%Gr. composite.....		

.....93 Fig. 4-22 The thermal analysis result for A356+4wt%Gr. composite.....	93
Fig. 4-23 A comparison of solid fraction (fs) and solidification temperature for A413+4wt%Gr. composite.....	
.....94 Fig. 4-24 The thermal analysis result for A413+4wt%Gr. composite.....	94
.....94 Fig. 4-25 A comparison of solid fraction (fs) and solidification temperature for A390+4wt%Gr. composite.....	
.....95 Fig. 4-26 The thermal analysis result for A390+4wt%Gr. composite.....	95
.....95 Fig. 4-27 A comparison of solid fraction (fs) and solidification temperature for A356+10wt%SiCp+4wt% Gr. composite.....	
.....96 Fig. 4-28 The thermal analysis result for A356+10wt%SiCp +4wt%Gr. composite.....	96
.....96 Fig. 4-29 A comparison of solid fraction (fs) and solidification temperature for A413+10wt%SiCp+4wt% Gr. composite.....	
.....97 Fig. 4-30 The thermal analysis result for A413+10wt%SiCp+4wt% Gr. composite.....	97
.....97 Fig. 4-31 A comparison of solid fraction (fs) and solidification temperature for A390+10wt%SiCp+4wt% Gr. composite.....	
.....98 Fig. 4-32 The thermal analysis result for A390+10wt%SiCp+4wt% Gr. composite.....	98
.....98 Fig. 4-33 The positions of the thermocouples superimposed on the spiral fluidity casting and the temperatures and solid fractions measured for A356+10wt.%SiCp+4wt.% Gr. composite.....	
.....99 Fig. 4-34 The dynamic thermal analysis results for A356+10wt.% SiCp+4wt.%Gr.composite.....	100
.....100 Fig. 4-35 The positions of the thermocouples superimposed on the spiral fluidity casting and the temperatures and solid fractions measured for A413+10wt.%SiCp+4wt.% Gr. composite.....	
.....101 Fig. 4-36 The dynamic thermal analysis results for A413+10wt.% SiCp+4wt.%Gr. composite.....	102
.....102 Fig. 4-37 The positions of the thermocouples superimposed on the spiral fluidity casting and the temperatures and solid fractions measured for A390+10wt.%SiCp+4wt.% Gr. composite.....	
.....103 Fig. 4-38 The dynamic thermal analysis results for A390+10wt% SiCp+4wt%Gr. composite.....	104
.....104 Fig. 4-39 Microstructures of A356+2wt%Gr. composite observed at the spiral fluidity casting reveal the different solidification. (a)entrance : progressive solidification (b)mid-section : progressive solidification (c)flow tip : mushy solidification.....	106
.....106 Fig. 4-40 Microstructures of A356+4wt%Gr. composite observed at the spiral fluidity casting reveal the different solidification. (a)entrance : mushy solidification (b)mid-section : mushy solidification (c)flow tip : mushy solidification.....	108
.....108 Fig. 4-41 Microstructures of A356+8wt%Gr. composite observed at the spiral fluidity casting reveal the different solidification. (a)entrance : mushy solidification (b)mid-section : mushy solidification (c)flow tip : mushy solidification.....	110
.....110 Fig. 4-42 Microstructures of A413+2wt%Gr. composite observed at the spiral fluidity casting reveal the different solidification. (a)entrance : progressive solidification (b)mid-section : progressive solidification (c)flow tip : mushy solidification.....	112
.....112 Fig. 4-43 Microstructures of A413+4wt%Gr. composite observed at the spiral fluidity casting reveal the different solidification. (a)entrance : progressive solidification (b)mid-section : progressive solidification (c)flow tip : mushy solidification.....	114
.....114 Fig. 4-44 Microstructures of A413+8wt%Gr. composite observed at the spiral fluidity casting reveal the different solidification. (a)entrance : mushy solidification (b)mid-section : mushy solidification (c)flow tip : mushy solidification.....	116
.....116 Fig. 4-45 Microstructures of A390+2wt%Gr. composite observed at the spiral fluidity casting reveal the different solidification. (a)entrance : progressive solidification (b)mid-section : progressive solidification (c)flow tip : mushy solidification.....	118
.....118 Fig. 4-46 Microstructures of A390+4wt%Gr. composite observed at the spiral fluidity casting reveal the different solidification. (a)entrance : mushy solidification (b)mid-section : mushy solidification (c)flow tip : mushy solidification.....	120
.....120 Fig. 4-47 Microstructures of A390+8wt%Gr. composite observed at the spiral fluidity casting reveal the different solidification. (a)entrance : mushy solidification (b)mid-section : mushy solidification (c)flow tip : mushy solidification.....	122
.....122 Fig. 4-48 Microstructures of A356+5wt%SiCp+4wt%Gr. composite observed at the spiral fluidity casting reveal the different solidification. (a)entrance : mushy solidification (b)mid-section : mushy solidification (c)flow tip : mushy solidification.....	124
.....124 Fig. 4-49 Microstructures of A356+10wt%SiCp+4wt%Gr. composite observed at the spiral fluidity casting reveal the different solidification. (a)entrance : mushy solidification (b)mid-section : mushy solidification (c)flow tip : mushy solidification.....	126
.....126 Fig. 4-50 Microstructures of A356+15wt%SiCp+4wt%Gr. composite observed at the spiral fluidity casting reveal the different solidification. (a)entrance : mushy solidification.....	127
.....127 Fig. 4-51 Microstructures of A413+5wt%SiCp+4wt%Gr. composite observed at the spiral fluidity casting reveal the different solidification. (a)entrance : mushy solidification (b)mid-section : mushy solidification (c)flow tip : mushy solidification.....	129
.....129 Fig. 4-52 Microstructures of A413+10wt%SiCp+4wt%Gr. composite observed at the spiral fluidity casting reveal the different solidification. (a)entrance : mushy solidification (b)mid-section : mushy solidification (c)flow tip : mushy solidification.....	131
.....131 Fig. 4-53 Microstructures of A413+15wt%SiCp+4wt%Gr. composite observed at the spiral fluidity casting reveal the different solidification. (a)entrance : mushy solidification.....	
.....132 Fig. 4-54 Microstructures of A390+5wt%SiCp+4wt%Gr. composite observed at the spiral fluidity casting reveal the different solidification. (a)entrance : mushy solidification (b)mid-section : mushy solidification (c)flow tip : mushy solidification.....	
.....134 Fig. 4-55 Microstructures of A413+10wt%SiCp+4wt%Gr. composite observed at the spiral fluidity casting reveal the	

different solidification. (a)entrance : mushy solidification (b)mid-section : mushy solidification (c)flow tip : mushy solidification.....	
.....136 Fig. 4-56 Microstructures of A390+15wt%SiCp+4wt%Gr. composite observed at the spiral fluidity casting reveal the different solidification. (a)flow tip : mushy solidification.....	137 Fig. 4-57 The SEM microstructures observed for A356+5wt%SiCp +4wt %Gr. composite by deep etching. (a)~(c) SEM observations (d)~(f) EDAX chemical analyses.....
.....141 Fig. 4-58 The SEM microstructures observed for A413+5wt%SiCp +4wt %Gr. composite by deep etching. (a)~(c) SEM observations (d)~(f) EDAX chemical analyses.....	145 Fig. 4-59 The SEM microstructures observed for A390+5wt%SiCp +4wt %Gr. composite by deep etching. (a)~(b) SEM observations (c)~(f) EDAX chemical analyses.....
.....150 表目錄 Table 2-1 History of Metal Matrix Composites in Automotive Application.....14 Table 2-2 Characteristics of particulate ceramic reinforcements.....
.....15 Table 2-3 Comparison of different manufacturing techniques of composites.....16 Table 3-1 The chemical compositions analysis of three types of aluminum alloys.....
.....41 Table 3-2 The pouring temperature(Tp) of all AMC/SiCp/Gr. composites.....42 Table 4-1 Fluidity data for A356/Gr., A413/Gr.and A390/Gr. Composites with different amounts of Gr. poured at a superheat T=90.....
.....76 Table 4-2 The effect of superheat on the fluidity of A356/Gr. composites with different amounts of Gr.....76 Table 4-3 The effect of superheat on the fluidity of A413/Gr. composites with different amounts of Gr.....
.....77 Table 4-4 The effect of superheat on the fluidity of A390/Gr. composites with different amounts of Gr.....77 Table 4-5 Fluidity data for A356/SiCp/Gr., A413/SiCp/Gr. and A390/SiCp/Gr. composites with different amounts of SiCp poured at a superheat T=90.....
.....78 Table 4-6 The effect of superheat on the fluidity of A356/SiCp/Gr. composites with different amounts of SiCp.....78 Table 4-7 The effect of superheat on the fluidity of A413/SiCp/Gr. composites with different amounts of SiCp.....
.....79 Table 4-8 The effect of superheat on the fluidity of A390/SiCp/Gr. composites with different amounts of SiCp.....79 Table 4-9 Latent heat data for A356/Gr., A413/Gr. and A390/Gr. composites with different amount of Gr.
.....80 Table 4-10 Latent heat data for A356/SiCp/Gr., A413/SiCp/Gr. and A390/SiCp/Gr. composites with different amount of Gr.....80 Table 4-11 Effect of Gr. amounts on the solidification temperature and solidification time of A356/Gr., A413/Gr. and A390/Gr. composites.....
.....81 Table 4-12 Effect of SiCp/Gr. and minor elements additions on the solidification temperature and solidification time of A356/SiCp/Gr. , A413/SiCp/Gr. and A390/SiCp/Gr. composites.....82

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