

# The Field Emission Characteristics of Carbon Nanotubes Produced with Zinc Oxide Catalyst

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## ABSTRACT

In this study, carbon nanotubes (CNT) were synthesized on ZnO nanorods using thermal chemical vapor deposition. ZnO nanorods were coated on silicon substrates by hydrothermal process. The CNT growth temperature was maintained at 900°C at an ambient pressure. Methane and argon gases are used for the CNT synthesis. In this work, scanning electron microscopy (SEM) image was used to observe the surface morphology and side-wall structure, energy dispersive spectrometer (EDS) was used for the identification and analysis of the chemical composition on the surface of CNTs, and Raman spectroscopy was employed to investigate the CNTs structural. Our research results reveal that the carbon nanotubes grown on ZNO nanorods showed a multiwalled structure with defective graphite sheets at the wall. The SEM images and showed that CNTs were quite uniform and disordered. Raman spectra show that there is larger crystallinity or little amorphous carbon than those grown on ZnO nanorods. EDS results reveal that the CNTs grown on ZnO nanorods do not need any purification process to optimize the field emission characteristics of the CNTs. The Fowler-Nordheim plot showed a good linear fit, indicating that the emission current of carbon nanotubes follows Fowler-Nordheim behavior.

Keywords : carbon nanotube ; thermal chemical vapor deposition ; field emission

## Table of Contents

封面內頁 簽名頁 授權書 . . . . .	iii	中文摘要 . . . . .	iii
. . . . . iv 英文摘要 . . . . .	iv	v 誌謝 . . . . .	v
. . . . . vi 目錄 . . . . .	vi	vii 圖目錄 . . . . .	vii
. . . . . x 表目錄 . . . . .	x	xv 第 . . . . .	xv
第一章 簡介 . . . . .	1	1.1.1 氧化鋅奈米柱簡介 . . . . .	1
. 1.1.2 奈米碳管簡介 . . . . .	3	1.3 奈米碳管的結構 . . . . .	3
. . . . . 5	5	1.4 奈米碳管的應用 . . . . .	8
. . . . . 10	10	第二章 氧化鋅文獻回顧 . . . . .	12
. . . . . 12	12	2.2 以氧化鋅成長奈米碳管之相關文獻 . . . . .	16
. . . . . 20	20	3.1 電子場發射理論 . . . . .	20
. . . . . 23	23	3.3 奈米碳管的成長機制 . . . . .	26
機制 . . . . .	26	3.2 催化劑在奈米碳管成長中扮演的角色 . . . . .	27
分類 . . . . .	28	3.4 奈米碳管的製程方法 . . . . .	30
. . . . . 37	37	3.5 實驗儀器 . . . . .	37
沉積系統 . . . . .	38	3.5.1 熱蒸鍍系統 . . . . .	37
析儀系統 . . . . .	41	3.5.2 熱化學氣相 . . . . .	37
裝置系統 . . . . .	45	3.5.3 掃描式電子顯微鏡系統 . . . . .	40
. . . . . 48	48	3.5.4 能量散佈分 . . . . .	43
奈米碳管 . . . . .	49	3.5.5 拉曼光譜儀系統 . . . . .	43
結果與討論 . . . . .	51	3.5.6 場發射量測 . . . . .	47
4.1.1 ZnO的SEM(掃描式電子顯微鏡)分析 . . . . .	52	3.6 實驗流程 . . . . .	47
4.1.2 ZnO的EDS(能量散佈分析儀)分析 . . . . .	55	3.7 實驗步驟 . . . . .	48
4.1.3 ZnO-CNT的SEM(掃描式電子顯微鏡)分析 . . . . .	57	3.7.1 成長氧化鋅奈米柱和蒸鍍催化劑金屬 . . . . .	48
4.1.4 ZnO-CNT的TEM(穿透式電子顯微鏡)分析 . . . . .	58	3.7.2 成長 . . . . .	50
4.1.5 ZnO-CNT的拉曼(拉曼光譜)分析 . . . . .	59	4.1 水煮時間1小時, 不同濃度ZnO對奈米碳管成長之影響 . . . . .	52
4.1.6 ZnO-CNT的EDS(能量散佈分析儀)分析 . . . . .	61	4.1.1 ZnO的SEM(掃描式電子顯微鏡)分析 . . . . .	52
4.1.7 電子場發射特性分析 . . . . .	63	4.1.2 ZnO的EDS(能量散佈分析儀)分析 . . . . .	55
液所成長的ZnO對奈米碳管成長之影響 . . . . .	68	4.1.3 ZnO-CNT的SEM(掃描式電子顯微鏡)分析 . . . . .	57
. 68	68	4.1.4 ZnO-CNT的TEM(穿透式電子顯微鏡)分析 . . . . .	58
. 73	73	4.1.5 ZnO-CNT的拉曼(拉曼光譜)分析 . . . . .	59
. 76	76	4.1.6 ZnO-CNT的EDS(能量散佈分析儀)分析 . . . . .	61
. 79	79	4.1.7 電子場發射特性分析 . . . . .	63
4.3 分別以ZnO和Ni金屬成長奈米碳管之比較 . . . . .	83	4.2 改變水煮時間, 固定濃度0.15M 的Zn(NO <sub>3</sub> ) <sub>2</sub> 和HMT水溶 . . . . .	68
. . . . .	83	4.2.1 ZnO的SEM(掃描式電子顯微鏡)分析 . . . . .	68
. . . . .	83	4.2.2 ZnO的EDS(能量散佈分析儀)分析 . . . . .	71
. . . . .	83	4.2.3 ZnO-CNT的SEM(掃描式電子顯微鏡)分析 . . . . .	73
. . . . .	83	4.2.4 ZnO-CNT的TEM(穿透式電子顯微鏡)分析 . . . . .	75
. . . . .	83	4.2.5 ZnO-CNT的拉曼(拉曼光譜)分析 . . . . .	76
. . . . .	83	4.2.6 ZnO-CNT的EDS(能量散佈分析儀)分析 . . . . .	77
. . . . .	83	4.2.7 電子場發射特性分析 . . . . .	79
. . . . .	83	4.3 分別以ZnO和Ni金屬成長奈米碳管之比較 . . . . .	83
. . . . .	83	4.3.1 SEM(掃描式電子顯微鏡)分析 . . . . .	83

. 83 4.3.2 拉曼(拉曼光譜)分析 . . . . .	85 4.3.3 EDS(能量散佈分析儀)分析 . . . . .
. 86 4.3.4 電子場發射特性分析 . . . . .	87 第五章 結論 . . . . .
. . . . . 90 參考文獻 . . . . .	92 圖目錄 圖1-1、氧化鋅奈米柱結構 . . . . .
. . . . . 2 圖1-2、多層與單層奈米碳管構造 . . . . .	4 圖1-3、石墨片捲成奈米碳管之示意圖 . . . . .
. . . . . 6 圖1-4、扶手椅形奈米碳管 . . . . .	7 圖1-5、鋸齒形奈米碳管 . . . . .
. . . . . 7 圖1-6、對掌形奈米碳管 . . . . .	8
圖2-1、水熱法為溫度65oC所製備出的氧化鋅奈米柱 . . . . .	14 圖2-2、水熱法為溫度70oC所製備出的氧化鋅奈米柱 . . . . .
. . . . . 14 圖2-3、水熱法為溫度75oC所製備出的氧化鋅奈米柱 . . . . .	14 圖2-4、水熱法為溫度80oC所製備出的氧化鋅奈米柱 . . . . .
. . . . . 15 圖2-5、水熱法為溫度85oC所製備出的氧化鋅奈米柱 . . . . .	15 圖2-6、為水熱法80oC製備出的奈米柱側面圖 . . . . .
. . . . . 15 圖2-7、無衝層所製備出的氧化鋅奈米柱 . . . . .	16 圖2-8、EDS成分分析圖 . . . . .
. . . . . 16 圖2-9、(a)低倍、(b)高倍SEM影像圖 . . . . .	18 圖2-10、(a)低倍、(b)高倍TEM影像圖 . . . . .
. . . . . 18 圖2-11、奈米碳管拉曼光譜圖 . . . . .	19 圖2-12、電流密度與施加電場之(E-J)曲線圖和相對應的Fowler-Nordheim (F-N)圖 . . . . .
. . . . . 19 圖3-1、(a)金屬 - 真空能帶示意圖 - 未加電場 (b)金屬 - 真空能帶示意圖 - 外加高電場 . . . . .	23 圖3-2、鋅蒸氣氧化法製備氧化鋅四針狀鬚晶結構圖 . . . . .
. . . . . 24 圖3-3、CNT成長機制示意圖(C是碳氫化合物氣體分解後的碳源) . . . . .	27 圖3-4、碳經由催化劑表面擴散示意圖 . . . . .
. . . . . 30 圖3-5、底部成長模式及頂部成長模式示意圖 . . . . .	30 圖3-6、(a)弧光放電方法示意圖、(b)弧光放電法設備示意圖 . . . . .
. . . . . 31 圖3-7、(a)雷射剝蝕製程設備圖、(b)雷射剝蝕法儀器示意圖 . . . . .	32 圖3-8、碳氫化合物氣相熱分解法 . . . . .
. . . . . 34 圖3-9、燈絲熱裂解化學氣相沉積法 . . . . .	36 圖3-10、利用多孔矽基板以thermal-CVD成長具方向性排列的CNT . . . . .
. . . . . 36 圖3-11、電阻式蒸鍍系統 . . . . .	38 圖3-12、高溫氧化爐管(簡圖) . . . . .
. . . . . 39 圖3-13、場發式電子顯微鏡 . . . . .	41 圖3-14、顯微拉曼及光激光譜儀 . . . . .
. . . . . 44 圖3-15、電性量測(簡圖) . . . . .	46 圖3-16、場發射量測裝置系統, 圖(a) ~ (f)說明於內文中 . . . . .
. . . . . 46 圖4-1、不同濃度Zn(NO <sub>3</sub> ) <sub>2</sub> 和HMT水溶液所成長的ZnO的上視影像圖: (a) 0.05M、(b) 0.075M、(c) 0.1M、(d) 0.125M、(e) 0.15M、(f) 0.175M。放大倍率為3千倍 . . . . .	53 圖4-2、不同濃度Zn(NO <sub>3</sub> ) <sub>2</sub> 和HMT水溶液所成長的ZnO的上視影像圖: (a) 0.05M、(b) 0.075M、(c) 0.1M、(d) 0.125M、(e) 0.15M、(f) 0.175M。放大倍率為3萬倍 . . . . .
. . . . . 54 圖4-3、ZnO管徑與Zn(NO <sub>3</sub> ) <sub>2</sub> 和HMT水溶液濃度之關係圖 . . . . .	54 圖4-4、ZnO沉積厚度與Zn(NO <sub>3</sub> ) <sub>2</sub> 和HMT水溶液濃度之關係圖 . . . . .
. . . . . 55 圖4-5、不同濃度Zn(NO <sub>3</sub> ) <sub>2</sub> 和HMT水溶液所成長的ZnO材料元素百分比分佈圖 . . . . .	56 圖4-6、不同濃度Zn(NO <sub>3</sub> ) <sub>2</sub> 和HMT水溶液所成長的ZnO-CNT的上視影像圖: (a) 0.05M、(b) 0.075M、(c) 0.1M、(d) 0.125M、(e) 0.15M、(f) 0.175M。放大倍率為3千倍 . . . . .
. . . . . 57 圖4-7、不同濃度Zn(NO <sub>3</sub> ) <sub>2</sub> 和HMT水溶液所成長的ZnO-CNT的上視影像圖: (a) 0.05M、(b) 0.075M、(c) 0.1M、(d) 0.125M、(e) 0.15M、(f) 0.175M。放大倍率為10萬倍 . . . . .	58 圖4-8、TEM影像圖, 其中: (a) 1萬倍、(b) 4萬倍、(c) 8萬倍 59 圖4-9、不同濃度Zn(NO <sub>3</sub> ) <sub>2</sub> 和HMT水溶液所成長的ZnO-CNT拉曼光譜圖 . . . . .
. . . . . 60 圖4-10、0.05M至0.175M的Zn(NO <sub>3</sub> ) <sub>2</sub> 和HMT水溶液所成長ZnO-CNT中主要元素之百分比分佈圖 . . . . .	63 圖4-11、不同濃度Zn(NO <sub>3</sub> ) <sub>2</sub> 和HMT水溶液所成長的ZnO-CNT之電流密度與施加電場之(E-J)曲線圖 . . . . .
. . . . . 66 圖4-12、電場強度19V/μm應用電場下的發射電流密度比較圖 . . . . .	67 圖4-13、不同濃度Zn(NO <sub>3</sub> ) <sub>2</sub> 和HMT水溶液所成長的ZnO-CNT之相對應的Fowler-Nordheim (F-N)圖 . . . . .
. . . . . 67 圖4-14、不同水煮時間所成長的ZnO的上視影像圖, 其中: (a) 1小時、(b) 1.5小時、(c) 2小時、(d) 2.5小時、(e) 3小時。放大倍率為3千倍 . . . . .	69 圖4-15、不同水煮時間所成長的ZnO的上視影像圖, 其中: (a) 1小時、(b) 1.5小時、(c) 2小時、(d) 2.5小時、(e) 3小時。放大倍率為3萬倍 . . . . .
. . . . . 70 圖4-16、ZnO管徑與水煮時間之關係圖 . . . . .	70 圖4-17、ZnO沉積厚度與水煮時間之關係圖 . . . . .
. . . . . 71 圖4-18、不同水煮時間所成長的ZnO材料中的元素百分比分佈圖 72 圖4-19、不同水煮時間所成長的ZnO-CNT的上視影像圖, 其中: (a) 1小時、(b) 1.5小時、(c) 2小時、(d) 2.5小時、(e) 3小時。放大倍率為3千倍 . . . . .	74 圖4-20、不同水煮時間所成長的ZnO-CNT的上視影像圖, 其中: (a) 1小時、(b) 1.5小時、(c) 2小時、(d) 2.5小時、(e) 3小時。放大倍率為10萬倍 . . . . .
. . . . . 74 圖4-21、TEM影像圖, 其中: (a) 水煮時間1小時所成長的ZnO-CNT、1萬倍, (b) 水煮時間2小時所成長的ZnO-CNT、1萬倍, (c) 水煮時間2小時所成長的ZnO-CNT、10萬倍 . . . . .	75 圖4-22、不同水煮時間所成長的ZnO-CNT拉曼光譜圖 . . . . .
. . . . . 76 圖4-23、不同水煮時間所成長的ZnO-CNT材料元素百分比分佈圖 . . . . .	78 圖4-24、不同水煮時間所成長的ZnO-CNT之電流密度與施加電場之(E-J)曲線圖 . . . . .
. . . . . 81 圖4-25、電場強度19V/μm應用電場下的發射電流密度比較圖 . . . . .	81 圖4-26、不同水煮時間所成長的ZnO-CNT之相對應的Fowler-Nordheim (F-N)圖 . . . . .
. . . . . 82 圖4-27、(a)水煮1小時所成長的ZnO-CNT、(b)水煮2小時所成長的ZnO-CNT。(c)Ni-CNT。放大倍率為3千倍 . . . . .	84 圖4-28、(a)水煮1小時所成長的ZnO-CNT、(b)水煮2小時所成長的ZnO-CNT。(c)Ni-CNT。放大倍率為3萬倍 . . . . .
. . . . . 84 圖4-29、水	

煮1、2小時所成長的ZnO-CNT和Ni-CNT拉曼光譜圖85 圖4-30、水煮1、2小時所成長的ZnO-CNT和Ni-CNT之電流密度與施加電場之(E-J)曲線圖 . . . . . 88 圖4-31、水煮1、2小時所成長的ZnO-CNT和Ni-CNT之相對應的Fowler-Nordheim (F-N)圖 . . . . . 89 表目錄 表4-1、不同濃度Zn(NO<sub>3</sub>)<sub>2</sub>和HMT水溶液所成長的ZnO材料元素百分比 . . . . . 56 表4-2、不同濃度Zn(NO<sub>3</sub>)<sub>2</sub>和HMT水溶液所成長的ZnO-CNT拉曼光譜分析之D帶強度ID與G帶強度IG之比值關係表 . . . . . 61 表4-3、0.05M至0.175M的Zn(NO<sub>3</sub>)<sub>2</sub>和HMT水溶液所成長ZnO-CNT材料中的元素百分比 . . . . . 62 表4-4、不同濃度Zn(NO<sub>3</sub>)<sub>2</sub>和HMT水溶液所成長的ZnO-CNT的場發射(F-N)圖所計算出的斜率 - 場增強因子 . . . . . 68 表4-5、不同水煮時間所成長的ZnO材料元素百分比 . . . . . 72 表4-6、不同水煮時間所成長的ZnO-CNT拉曼光譜分析之D帶強度ID與G帶強度IG之比值關係表 . . . . . 77 表4-7、不同水煮時間所成長的ZnO-CNT材料元素百分比 . . . . . 78 表4-8、不同水煮時間所成長的ZnO-CNT的場發射(F-N)圖所計算出的斜率 - 功函數 . . . . . 82 表4-9、水煮1、2小時所成長的ZnO-CNT和Ni-CNT拉曼光譜分析之D帶強度ID與G帶強度IG之比值關係表 . . . . . 86 表4-10、水煮1、2小時所成長的ZnO-CNT和Ni-CNT材料元素百分比 . . . . . 87 表4-11、水煮1、2小時所成長的ZnO-CNT和Ni-CNT的場發射(F-N)圖所計算出的斜率 - 功函數 . . . . . 89

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