

**THE SYNTHESIS, FUNCTIONALISATION AND  
CHARACTERISATION OF CARBON  
NANOTUBES / ALUMINA HYBRID COMPOUND  
AND ITS NANOCOMPOSITES**

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CHARACTERISATION OF CARBON NANOTUBES / ALUMINA  
HYBRID COMPOUND AND ITS NANOCOMPOSITES**

**by**

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## TABLE OF CONTENTS

	<b>Page</b>
<b>ACKNOWLEDGEMENTS</b>	ii
<b>TABLE OF CONTENTS</b>	iii
<b>LIST OF TABLES</b>	ix
<b>LIST OF FIGURES</b>	xii
<b>LIST OF ABBREVIATIONS</b>	xx
<b>LIST OF SYMBOLS</b>	xxii
<b>ABSTRAK</b>	xxvii
<b>ABSTRACT</b>	xxix
<b>CHAPTER ONE : INTRODUCTION</b>	
1.1 Research and development of carbon nanotubes (CNT)	1
1.2 The use of CNT hybrid in polymer composite	3
1.3 Problem statements	4
1.4 Research objectives	6
1.5 Outline of the thesis	7
<b>CHAPTER TWO : LITERATURE REVIEW</b>	
2.1 Introduction	10
2.1.1 History development of carbon nanotubes (CNT)	10
2.1.2 CNT structure form (SWCNT and MWCNT)	13
2.1.3 Characterisation method of CNT	16
2.1.4 Properties of SWCNT and MWCNT	20
2.1.4 (a) Tensile properties	20
2.1.4 (b) Electrical properties	22
2.1.4 (c) Thermal properties	23
2.2 Synthesis of CNT	23
2.2.1 Chemical vapour deposition (CVD)	25
2.2.1 (a) Formation of CNT via CVD	26
2.2.1 (b) Catalyst sizes effect on CNT formation	29
2.2.2 CNT hybrid	31
2.2.2 (a) Introduction	31

2.2.2 (b)	Development of CNT hybrid growth by CVD	32
2.3	CNT hybrid polymer composite	38
2.3.1	Introduction	38
2.3.2	Polydimethylsiloxane (PDMS) / CNT composite	39
2.4	Dispersion of CNT hybrid in polymer composite	43
2.4.1	Fundamental problem of CNT dispersion	43
2.4.2	Mechanical dispersion of CNTs	44
2.4.2 (a)	Ultrasonication	44
2.5	Chemical functionalisation of CNT	47
2.5.1	Covalent functionalisation	48
2.5.2	Non Covalent functionalisation	51
2.5.3	Oxidising agents	52
2.5.3 (a)	Oxidising acid	52
2.5.3 (b)	Natural reagent (e.g. palm oil, olive oil)	56
2.6	Summary	59

### **CHAPTER THREE : MATERIALS AND METHODOLOGY**

3.1	Introduction	60
3.2	Raw materials and chemicals	60
3.2.1	Aluminium	60
3.2.2	Sodium hydroxide	61
3.2.3	Nickel nitrate	62
3.2.4	Iron nitrate	62
3.2.5	Cobalt nitrate	63
3.2.6	Hydrogen gas (H <sub>2</sub> )	64
3.2.7	Nitrogen gas (N <sub>2</sub> )	64
3.2.8	Methane gas (CH <sub>4</sub> )	65
3.2.9	Sulphuric acid (H <sub>2</sub> SO <sub>4</sub> )	66
3.2.10	Nitric acid (HNO <sub>3</sub> )	66
3.2.11	Palm oil	67
3.2.12	Olive oil	68
3.2.13	Polydimethylsiloxane (PDMS)	69
3.3	Experimental procedures	70
3.3.1	Growth of MWCNT-alumina hybrid compound by using various catalysts	70

3.3.2	Growth of MWCNT-alumina hybrid compound (various ball milling time)	70
3.3.3	Functionalisation of MWCNT-alumina hybrid compound using acid ( $\text{H}_2\text{SO}_4$ : $\text{HNO}_3$ )	71
3.3.4	Functionalisation of MWCNT-alumina hybrid compound using natural reagents (palm oil and olive oil)	72
3.3.5	Fabrication of MWCNT-alumina hybrid compound/PDMS composite	72
3.4	Materials characterisation	73
3.4.1	Brunauer-Emmet-Teller (BET)	73
3.4.2	Barrett-Joyner-Halenda (BJH)	74
3.4.3	Density functional theory (DFT)	75
3.4.4	X-ray photoelectron spectroscopy (XPS)	75
3.4.5	X-ray diffraction (XRD)	75
3.4.6	Fourier transform infrared spectroscopy (FTIR)	76
3.4.7	Raman spectroscopy	76
3.4.8	Energy dispersive X-ray spectroscopy (EDX)	76
3.4.9	Field emission scanning electron microscopy (FESEM)	77
3.4.10	High resolution transmission electron microscopy (HRTEM)	77
3.4.11	Tensile test	77
3.4.12	Dielectric test	78
3.4.13	Thermal conductivity	78
3.4.14	Thermogravimetric analysis (TGA)	79
3.4.15	Differential scanning calorimetry (DSC)	79
3.4.16	Coefficient of thermal expansion (CTE)	79
3.5	Experimental Chart	80

#### **CHAPTER FOUR : EFFECTS OF VARIOUS TRANSITION METAL CATALYSTS (NICKEL NITRATE, COBALT NITRATE, FERUM NITRATE) ON THE SYNTHESIS OF MWCNT- ALUMINA HYBRID COMPOUND**

4.1	Introduction	82
4.2	Physical appearance and chemical structure	82
4.3	Morphological analysis	86
4.3.1	Field emission scanning electron microscopy (FESEM)	86
4.3.2	High resolution transmission electron microscopy (HRTEM)	88

4.4	Chemical / elemental / surface chemistry analysis	91
4.4.1	Energy dispersive X-ray spectroscopy (EDX)	91
4.4.2	X-ray photoelectron spectroscopy (XPS)	93
4.4.3	X-ray diffraction (XRD)	96
4.4.4	Fourier transform infrared spectroscopy (FTIR)	98
4.4.5	Raman spectroscopy	99
4.5	Surface area / pore size / volume analysis	103
4.5.1	Brunauer-Emmet-Teller (BET)	103
4.5.2	Barrett-Joyner-Halenda (BJH)	109
4.5.3	Density functional theory (DFT)	112
4.6	Thermal analysis	115
4.6.1	Thermal conductivity	115
4.6.2	Thermogravimetric analysis (TGA)	117
4.7	Summary	119

## **CHAPTER FIVE : EFFECTS OF BALL MILLING TIME ON THE CHARACTERISTIC OF MWCNT-ALUMINA HYBRID COMPOUND**

5.1	Introduction	120
5.2	Morphological analysis	120
5.2.1	Field emission scanning electron microscopy (FESEM) and High resolution transmission electron microscopy (HRTEM)	120
5.3	Chemical / elemental / surface chemistry analysis	130
5.3.1	X-ray photoelectron spectroscopy (XPS)	130
5.3.2	X-ray diffraction (XRD)	134
5.3.3	Fourier transform infrared spectroscopy (FTIR)	136
5.3.4	Raman spectroscopy	138
5.4	Thermal analysis	142
5.4.1	Thermal conductivity	142
5.5	Summary	144

## **CHAPTER SIX : FUNTIONALISATION OF MWCNT-ALUMINA HYBRID COMPOUND USING SULFURIC ACID AND NITRIC ACID (H<sub>2</sub>SO<sub>4</sub> : HNO<sub>3</sub>) AND NATURAL REAGENTS (PALM OIL AND OLIVE OIL)**

6.1	Introduction	145
6.2	Physical appearance and chemical structure	145

6.3	Morphological analysis	147
6.3.1	High resolution transmission electron microscopy (HRTEM)	147
6.4	Chemical / elemental / surface chemistry analysis	150
6.4.1	Energy dispersive X-ray spectroscopy (EDX)	150
6.4.2	X-ray photoelectron spectroscopy (XPS)	152
6.4.3	X-ray diffraction (XRD)	157
6.4.4	Fourier transform infrared spectroscopy (FTIR)	158
6.4.5	Raman spectroscopy	160
6.5	Summary	163

## **CHAPTER SEVEN : EFFECTS OF FUNCTIONALISATION AND DISPERSION ON THE PROPERTIES OF MWCNT-ALUMINA HYBRID COMPOUND / PDMS COMPOSITES**

7.1	Introduction	164
7.2	Physical appearance and chemical structure	164
7.3	Morphological analysis	166
7.3.1	Field emission scanning electron microscopy (FESEM)	166
7.4	Chemical / elemental / surface chemistry analysis	168
7.4.1	X-ray diffraction (XRD)	168
7.4.2	Fourier transform infrared spectroscopy (FTIR)	170
7.4.3	Energy dispersive X-ray spectroscopy (EDX)	172
7.5	Mechanical analysis	174
7.5.1	Tensile test	174
7.6	Electrical analysis	179
7.6.1	Dielectric test	179
7.7	Thermal analysis	183
7.7.1	Thermal conductivity	183
7.7.2	Thermogravimetric analysis (TGA)	185
7.7.3	Differential scanning calorimetry (DSC)	188
7.7.4	Coefficient of thermal expansion (CTE)	190
7.8	Summary	194

## **CHAPTER EIGHT : CONCLUSIONS AND SUGGESTION FOR FUTURE WORK**

8.1	Conclusions	195
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8.2	Suggestions for future work	198
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<b>REFERENCES</b>	199
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## **APPENDICES**

Appendix A : List of international journals

Appendix B : List of attended conferences

## LIST OF TABLES

		<b>Page</b>
Table 2.1	Part of characterisation method to analyse CNT.	16
Table 2.2	Part of the experimental conditions correlated to the sizes of catalyst for CNT formation.	30
Table 2.3	Development of CNTs/alumina production.	33
Table 2.4	Development of CNTs/PDMS composites production.	42
Table 3.1	Properties of aluminium powder.	61
Table 3.2	Properties of sodium hydroxide.	61
Table 3.3	Properties of nickel nitrate.	62
Table 3.4	Properties of iron nitrate.	63
Table 3.5	Properties of cobalt nitrate.	63
Table 3.6	Properties of hydrogen gas.	64
Table 3.7	Properties of nitrogen gas.	65
Table 3.8	Properties of methane gas.	65
Table 3.9	Properties of sulphuric acid.	66
Table 3.10	Properties of nitric acid.	67
Table 3.11	Content of the palm oil.	67
Table 3.12	Content of the olive oil.	68
Table 3.13	Properties of polydimethylsiloxane.	69
Table 3.14	Properties of silicone elastomer curing agent.	69
Table 3.15	Details of milling conditions	71
Table 4.1	Distribution of CNT diameter in CNT-alumina hybrid with various transition metal type based on FESEM morphology.	88
Table 4.2	Intensity values of D, G, and D' band; relative intensity $I_D / I_G$ , $I_{D'} / I_G$ and $I_{D'} / I_D$ in the Raman spectra estimated from the raw data.	103
Table 4.3	Parameters of MWCNT-alumina in Ni, Co and Fe.	107

Table 4.4	Specific surface area of MWCNT-alumina with Ni, Co and Fe.	108
Table 4.5	BJH adsorption summary data of samples.	111
Table 4.6	DFT method data summary.	114
Table 4.7	Thermal conductivity, thermal diffusivity and specific heat of MWCNT-alumina hybrid compound produced using Ni, Co and Fe.	116
Table 4.8	Losses of weight (%) with temperature (°C) at onset temperature, and final loss of weight (%) at 1000 °C.	119
Table 5.1	Particle sizes measurement of MWCNT-alumina hybrid compound produced using unmilled catalyst (0 hour) and catalyst milled (5, 10 and 15 hours).	129
Table 5.2	Surface composition of MWCNT-alumina produced in unmilled catalyst (0 hour) and catalyst milled at various milling time (5, 10 and 15 hours).	133
Table 5.3	Average purity value of the samples generated from experimental.	142
Table 5.4	Thermal conductivity, thermal diffusivity and specific heat of MWCNT-alumina hybrid compound produced using unmilled catalyst (0 hour) and catalyst milled (5, 10 and 15 hours).	143
Table 6.1	Composition of C, O and Al element in the MWCNT-alumina treated with (a) H <sub>2</sub> SO <sub>4</sub> : HNO <sub>3</sub> reflux 50 °C/ 24 h (b) H <sub>2</sub> SO <sub>4</sub> : HNO <sub>3</sub> reflux 100 °C/ 2 h (c) Palm oil, and (d) olive oil.	152
Table 6.2	Intensity values of D, G, D' and G' band; relative intensity $I_D / I_G$ , $I_{D'} / I_G$ and $I_{D'} / I_D$ in the Raman spectra estimated from the raw data.	162
Table 7.1	Composition of C, O, Al and Si element in the MWCNT-alumina treated with (a) PDMS, (b) 0.5 wt% MWCNT-alumina/ PDMS (c) 1.0 wt% MWCNT-alumina/ PDMS, and (d) 1.5 wt% MWCNT-alumina/ PDMS.	174
Table 7.2	Mean and standard deviation values of tensile strength, tensile strain and tensile modulus of (a) PDMS, (b) 0.5 wt% MWCNT-alumina/ PDMS, (c) 1.0 wt% MWCNT-alumina/ PDMS, and (d) 1.5 wt% MWCNT-alumina/ PDMS.	177
Table 7.3	Permittivity and permittivity loss tangent of (a) PDMS, (b) 0.5 wt% MWCNT-alumina/ PDMS, (c) 1.0 wt% MWCNT-alumina/ PDMS, and (d) 1.5 wt% MWCNT-alumina/ PDMS.	181

Table 7.4	Thermal conductivity, thermal diffusivity and specific heat of (a) PDMS, (b) 0.5 wt% MWCNT-alumina/ PDMS (c) 1.0 wt% MWCNT-alumina/ PDMS, and (d) 1.5 wt% MWCNT-alumina/ PDMS at room temperature.	183
Table 7.5	Losses of weight (%) with temperature (°C) at onset temperature, and final loss of weight (%) at 900 °C; (a) PDMS, (b) 0.5 wt% MWCNT-alumina/ PDMS (c) 1.0 wt% MWCNT-alumina/ PDMS, and (d) 1.5 wt% MWCNT-alumina/ PDMS.	187
Table 7.6	Characteristic points obtained from DSC in (a) PDMS, (b) 0.5 wt% MWCNT-alumina/ PDMS (c) 1.0 wt% MWCNT-alumina/ PDMS, and (d) 1.5 wt% MWCNT-alumina/ PDMS.	189
Table 7.7	Coefficient of thermal expansion and expansion ratio at 150 °C in (a) PDMS, (b) 0.5 wt% MWCNT-alumina/ PDMS (c) 1.0 wt% MWCNT-alumina/ PDMS, and (d) 1.5 wt% MWCNT-alumina/ PDMS	193

## LIST OF FIGURES

	Page
Figure 2.1 Carbon in form of fullerenes.	11
Figure 2.2 Electron micrographs of MWCNT (a) 6.7 nm (b) 5.5 nm and (c) 6.5 nm.	11
Figure 2.3 Electron micrographs of SWCNT.	12
Figure 2.4 Structure of SWCNTs: (a) armchair (n,n) n=m (b) zigzag (n,0), m=0 (c) chiral (n,m), n≠m (Dresselhaus et al., 1995), and (d) the structure of MWCNTs.	13
Figure 2.5 A schematic diagram showing the form of graphene sheet.	15
Figure 2.6 FTIR spectrum of CNT (a) as-grown, (b) after TGA at 400 °C, (c) after annealing, and (d) after TGA at 900 °C.	16
Figure 2.7 CNT structure with different magnification (a) FESEM (b) HRTEM.	17
Figure 2.8 XPS spectrum of MWCNT (a) C1s, and (b) O1s.	18
Figure 2.9 XRD spectrum of well-aligned CNT.	19
Figure 2.10 Raman spectrums of SWCNT, DWCNT and MWCNT (a) RBM, (b) D and G bands.	19
Figure 2.11 SWCNT of (a) tensile specimen and (b-d) SEM of fracture surface.	21
Figure 2.12 Methane as a function of reaction time and the TG insert curves of MgO, Ni/MgO, Co/MgO and Fe/MgO.	25
Figure 2.13 Typical schematic illustration of the CVD method.	26
Figure 2.14 Schematic representations of the basic steps in CVD process.	27
Figure 2.15 Schematic representations step of the CNT growth mechanism.	28
Figure 2.16 TEM image of CNT using iron sizes (a) 3 nm, (b) 9 nm, (c) 13 nm, and (d – f) histograms of CNT diameter.	30
Figure 2.17 Distribution of catalyst sizes and CNT diameter (a) $D = 104 \mu^2$ , and (b) $D = 15 \mu^2$ ( $D = \text{number of particle per unit area}$ , Top: catalysts, middle: CNT (700 °C), and bottom: CNT (800 °C)).	31

Figure 2.18	CNT orientation showed by (a) Electrical field and potential contours, and (b) AFM image.	34
Figure 2.19	Before and after synthesis high yield of MWCNT alumina.	35
Figure 2.20	CNT growth of (a) carbon amount over temperature, and (b) SEM micrographs (600 °C, 30 min).	36
Figure 2.21	Chemical structure of polydimethylsiloxane.	39
Figure 2.22	Various MWCNT/PDMS of the thermal and electrical conductivity.	41
Figure 2.23	Schematic of (a) Stage 1: emulsion assisted by ultrasonic (b) Stage 2: conventional emulsion.	47
Figure 2.24	The sidewall functionalisation in covalent functionalisation of CNT and attachment of Fluorination and derivative reactions, Hydrogenation, Cycloaddition and Radical (R-) (Ma et al., 2010). *R- is alkyl, aryl, etc.	49
Figure 2.25	The defect functionalisation in covalent functionalisation of CNT: Amidation, Esterification, Thiolation, Silanization and Polymer grafting.	50
Figure 2.26	Chemical structure of carbon nanotubes functionalised with acid reagents (H <sub>2</sub> SO <sub>4</sub> :HNO <sub>3</sub> ).	53
Figure 2.27	Schematic of MWCNT modified with the COOH group *MMWCNT= MWCNT Modified	53
Figure 2.28	Schematic of the modified MWCNT with Dodecylamine of amine group.	54
Figure 2.29	Schematic of the modified MWCNT with 3-aminopropyl triethoxysilane of silane group.	54
Figure 2.30	The nanotubes length as a function of oxidation time (a) data form (b) statistical mean and standard deviations.	55
Figure 2.31	Raman spectrum of nanotubes oxidized times.	55
Figure 2.32	Raman spectrum of MWCNT (a) oxidized with HNO <sub>3</sub> and (b) oxidized with H <sub>2</sub> SO <sub>4</sub> / HNO <sub>3</sub> .	56
Figure 2.33	Chemical structure of (a) carbon nanotubes functionalised with palm oil (b) fatty acids in palm oil. (R= palmitate, stearate, myristate, oleate and linoleate)	57
Figure 2.34	Chemical structure of carbon nanotubes functionalised with olive oil. (R=alkyl groups (approx. 20%) or alkenyl groups	58

(approx. 80%)).

Figure 2.35	FTIR spectrum of (a) MWCNT (a) functionalised MWCNT with HNO <sub>3</sub> (c) functionalised MWCNT with olive oil.	59
Figure 3.1	Experimental chart of the research works.	81
Figure 4.1	Chemical structures of carbon nanotubes together with alumina.	83
Figure 4.2	Diagram of the synthesised CNT-alumina hybrid growth process. (1) After the hydrolysis (2) After the calcinations (3) CNT-alumina hybrid growth after through CVD process.	85
Figure 4.3	FESEM micrograph of CNT-alumina with (a) Ni, (b) Co and (c) Fe.	86-87
Figure 4.4	Common model mechanism of carbon nanotube growth.	87
Figure 4.5	HRTEM micrograph of MWCNT-alumina hybrid compound produced with (a) Ni, (b) Co and (c) Fe.	89
Figure 4.6	HRTEM micrographs distribution of C and Al element in MWCNT-alumina hybrid compound produced with (a) Ni, (b) Co and (c) Fe.	90
Figure 4.7	EDX elemental composition data of the MWCNT-alumina hybrid (a) Ni, (b) Co and (c) Fe.	92
Figure 4.8	XPS spectrum of MWCNT-alumina in Al (2p) region of (a) Ni, (b) Co, and (c) Fe.	93
Figure 4.9	XPS spectrum of MWCNT-alumina in C (1s) region of (a) Ni, (b) Co, and (c) Fe.	94
Figure 4.10	XPS spectrum of MWCNT-alumina in O (1s) region of (a) Ni, (b) Co, and (c) Fe.	95
Figure 4.11	XRD analysis of the MWCNT-alumina hybrid produced with (a) Ni, (b) Co and (c) Fe.	97
Figure 4.12	Crystal Structure Database (ICSD) pattern list of aluminium oxide/alumina (98-001-6811), graphite (98-006-2710), nickel (98-009-197), cobalt (98-008-6650), and ferum (98-006-2732).	97
Figure 4.13	FTIR spectra of MWCNT-alumina produced with (a) Ni, (b) Co and (c) Fe.	99
Figure 4.14	Raman spectra of MWCNT-alumina hybrid produced with	100

(a) Ni, (b) Co and (c) Fe.

Figure 4.15	Common schematic vibrations in carbon nanotubes for the RBM.	101
Figure 4.16	Common schematic vibrations of carbon atoms in carbon nanotubes for the G band.	102
Figure 4.17	Classification of the isotherm types by International Union of Pure and Applied Chemistry.	104
Figure 4.18	The nitrogen sorption isotherms of the MWCNT-alumina hybrid produced with (a) Ni, (b) Co and (c) Fe.	105
Figure 4.19	BET equation against pressure of MWCNT-alumina (a) Ni (b) Co and (c) Fe using N <sub>2</sub> adsorption under the pressure of 0.10 to 0.30.	107
Figure 4.20	Cumulative distributions of pores volume and differential pores size distribution dV(r) of MWCNT-alumina produced with (a) Ni, (b) Co and (c) Fe, using BJH method.	110
Figure 4.21	Cumulative distributions of pores volume and differential pores volume distribution dV (r) of MWCNT-alumina produced with (a) Ni, (b) Co and (c) Fe, using DFT method.	112-113
Figure 4.22	Temperature response of MWCNT-alumina produced with Ni, Co and Fe as a function of time.	115
Figure 4.23	TGA and DTG curve of MWCNT-alumina produced with various transition metal catalysts (a) Ni, (b) Co and (c) Fe.	118
Figure 5.1	Proposed mechanism of milling the precipitate catalyst before carbon nanotubes growth under CVD process.	121
Figure 5.2	MWCNT-alumina hybrid compound produced using unmilled catalyst (0 hours) (a) FESEM image and EDX analysis (b) HRTEM image and the intensity number of the wall from HRTEM image.	123
Figure 5.3	MWCNT-alumina hybrid compound produced using catalyst milled at 5 hours (a) FESEM image and EDX analysis (b) HRTEM image and the intensity number of the wall from HRTEM image.	124
Figure 5.4	MWCNT-alumina hybrid compound produced using catalyst milled at 10 hours (a) FESEM image and EDX analysis (b) HRTEM image and the intensity number of the wall from HRTEM image.	125
Figure 5.5	MWCNT-alumina hybrid compound produced using catalyst milled at 15 hours (a) FESEM image and EDX	126



	analysis (b) HRTEM image and the intensity number of the wall from HRTEM image.	
Figure 5.6	Conceptual diagram of MWCNT showing the dimension of graphite layers.	128
Figure 5.7	The surface area texture of precipitate catalyst and CNT (a) rough surface for unmilled (b) fined surface for milled in 5, 10 and 15 hours (c) CNT growth for precipitate catalyst milled in 5, 10 and 15 hours.	129
Figure 5.8	XPS spectrum Al (2p) region of MWCNT-alumina produced in unmilled catalyst (0 hour) and catalyst milled at various milling time (5, 10 and 15 hours).	130
Figure 5.9	XPS spectrum C (1s) region of MWCNT-alumina produced using unmilled catalyst (0 hour) and catalyst milled at various milling time (5, 10 and 15 hours).	131
Figure 5.10	XPS spectrum O (1s) region of MWCNT-alumina produced using unmilled catalyst (0 hour) and catalyst milled at various milling time (5, 10 and 15 hours).	133
Figure 5.11	XRD diffractogram of MWCNT-alumina hybrid compound produced using unmilled catalyst (0 hour) and catalyst milled at 5, 10 and 15 hours.	134
Figure 5.12	Crystal Structure Database (ICSD) pattern list aluminium oxide (98-001-6811), nickel (98-009-0198) and graphite (98-006-2710) result of x-ray diffraction diffractogram in MWCNT-alumina hybrid compound.	136
Figure 5.13	FTIR spectrum of MWCNT-alumina hybrid compound produced using unmilled catalyst (0 hour) and catalyst milled at various milling time (5, 10 and 15 hours).	137
Figure 5.14	Raman Spectrum of MWCNT-alumina hybrid compound produced using unmilled catalyst (0 hour) and catalyst milled at various milling time (5, 10 and 15 hours).	139
Figure 5.15	Raman intensity ratio $I_{D/G}$ , $I_{D'/G}$ and $I_{D'/D}$ of MWCNT-alumina hybrid compound produced using unmilled catalyst (0 hour) and catalyst milled at various milling time (5, 10 and 15 hours).	141
Figure 5.16	Description of the G peak and D peak of graphene.	142
Figure 5.17	Summary data works of MWCNT-alumina hybrid compound produced using unmilled catalyst (0 hour) and catalyst milled at various milling time (5, 10 and 15 hours).	144

Figure 6.1	Photographs of MWCNT-alumina hybrid treated with (a) H <sub>2</sub> SO <sub>4</sub> : HNO <sub>3</sub> reflux 50 °C/ 24 h (b) H <sub>2</sub> SO <sub>4</sub> : HNO <sub>3</sub> reflux 100 °C/ 2 h (c) palm oil, and (d) olive oil.	146
Figure 6.2	HRTEM image of MWCNT-alumina hybrid functionalised with (a) HNO <sub>3</sub> + H <sub>2</sub> O <sub>4</sub> for 50 °C (24 h) and (b) HNO <sub>3</sub> + H <sub>2</sub> SO <sub>4</sub> for 100 °C (2 h).	148
Figure 6.3	HRTEM image of MWCNT-alumina hybrid functionalised with (a) palm oil and (b) olive oil.	149
Figure 6.4	EDX image of MWCNT-alumina hybrid treated with (a) H <sub>2</sub> SO <sub>4</sub> : HNO <sub>3</sub> reflux 50 °C/ 24 h (b) H <sub>2</sub> SO <sub>4</sub> : HNO <sub>3</sub> reflux 100 °C/ 2 h (c) Palm oil, and (d) olive oil.	151
Figure 6.5	XPS spectrum of MWCNT-alumina hybrid in Al (2p) region treated with (a) H <sub>2</sub> SO <sub>4</sub> : HNO <sub>3</sub> reflux 50 °C/ 24 h (b) H <sub>2</sub> SO <sub>4</sub> : HNO <sub>3</sub> reflux 100 °C/ 2 h (c) palm oil, and (d) olive oil.	153
Figure 6.6	XPS spectrum of MWCNT-alumina hybrid in C (1s) region treated with (a) H <sub>2</sub> SO <sub>4</sub> : HNO <sub>3</sub> reflux 50 °C/ 24 h (b) H <sub>2</sub> SO <sub>4</sub> : HNO <sub>3</sub> reflux 100 °C/ 2 h (c) palm oil, and (d) olive oil.	155
Figure 6.7	XPS spectrum of MWCNT-alumina hybrid in O (1s) region treated with (a) H <sub>2</sub> SO <sub>4</sub> : HNO <sub>3</sub> reflux 50 °C/ 24 h (b) H <sub>2</sub> SO <sub>4</sub> : HNO <sub>3</sub> reflux 100 °C/ 2 h (c) palm oil, and (d) olive oil.	156
Figure 6.8	XRD diffractogram of MWCNT-alumina hybrid treated with (a) H <sub>2</sub> SO <sub>4</sub> : HNO <sub>3</sub> reflux 50 °C/ 24 h (b) H <sub>2</sub> SO <sub>4</sub> : HNO <sub>3</sub> reflux 100 °C/ 2 h (c) palm oil, and (d) olive oil.	158
Figure 6.9	FTIR spectra of MWCNT-alumina hybrid treated with (a) H <sub>2</sub> SO <sub>4</sub> : HNO <sub>3</sub> reflux 50 °C/ 24 h (b) H <sub>2</sub> SO <sub>4</sub> : HNO <sub>3</sub> reflux 100 °C/ 2 h (c) palm oil, and (d) olive oil.	160
Figure 6.10	Raman spectra of MWCNT-alumina hybrid treated with (a) HNO <sub>3</sub> + H <sub>2</sub> O <sub>4</sub> for 50 °C / 24 h (b) HNO <sub>3</sub> + H <sub>2</sub> SO <sub>4</sub> for 100 °C / 2 h (c) palm oil (d) Olive oil.	161
Figure 7.1	Samples of (a) PDMS, (b) 0.5 wt% MWCNT-alumina/ PDMS (c) 1.0 wt% MWCNT-alumina/ PDMS, and (d) 1.5 wt% MWCNT-alumina/ PDMS.	165
Figure 7.2	Chemical structures of PDMS.	166
Figure 7.3	Chemical structures of the functionalised MWCNT-alumina and PDMS.	166
Figure 7.4	FESEM morphology of (a) PDMS, (b) 0.5 wt% MWCNT-alumina/ PDMS (c) 1.0 wt% MWCNT-alumina/ PDMS,	167

	and (d) 1.5 wt% MWCNT-alumina/ PDMS.	
Figure 7.5	XRD diffractogram of (a) PDMS, (b) 0.5 wt% MWCNT-alumina/ PDMS (c) 1.0 wt% MWCNT-alumina/ PDMS, and (d) 1.5 wt% MWCNT-alumina/ PDMS.	168
Figure 7.6	Crystal Structure Database (ICSD) pattern list aluminium oxide (98-001-6811), nickel (98-009-0199), silicon oxide (98-006-1839) and carbon (98-006-7493) result of XRD diffractogram in PDMS and MWCNT-alumina/ PDMS composite.	170
Figure 7.7	FTIR spectrum of (a) PDMS, (b) 0.5 wt% MWCNT-alumina/ PDMS (c) 1.0 wt% MWCNT-alumina/ PDMS, and (d) 1.5 wt% MWCNT-alumina/ PDMS.	171
Figure 7.8	EDX analysis of (a) PDMS, (b) 0.5 wt% MWCNT-alumina/ PDMS (c) 1.0 wt% MWCNT-alumina/ PDMS, and (d) 1.5 wt% MWCNT-alumina/ PDMS.	173
Figure 7.9	Tensile stress-strain curve of (a) PDMS, (b) 0.5 wt% MWCNT-alumina/ PDMS, (c) 1.0 wt% MWCNT-alumina/ PDMS, and (d) 1.5 wt% MWCNT-alumina/ PDMS.	176
Figure 7.10	Tensile failure photographs of (a) PDMS, (b) 0.5 wt% MWCNT-alumina/ PDMS, (c) 1.0 wt% MWCNT-alumina/ PDMS, and (d) 1.5 wt% MWCNT-alumina/ PDMS.	178
Figure 7.11	Permittivity and permittivity loss tangent versus frequency of (a) PDMS, (b) 0.5 wt% MWCNT-alumina/ PDMS, (c) 1.0 wt% MWCNT-alumina/ PDMS, and (d) 1.5 wt% MWCNT-alumina/ PDMS.	180
Figure 7.12	Mechanism of electronic polarization in an atom, (a) No field ( $E=0$ ) and (b) Applied field ( $E \neq 0$ ). (- is electron negative, + is electron positive).	182
Figure 7.13	Mechanism of atomic or ionic polarization in an atom, (a) No field ( $E=0$ ) and (b) Applied field ( $E \neq 0$ ). (- is electron negative, + is electron positive).	182
Figure 7.14	Mechanism of orientation or dipolar polarization in a sample, (a) No field ( $E=0$ ) and (b) Applied field ( $E \neq 0$ ). (- is electron negative, + is electron positive).	182
Figure 7.15	Schematic diagram formation of heat dissipation interconnects functionalized MWCNT-alumina and PDMS.	184
Figure 7.16	Weight loss and derivative weight versus decomposition temperature of (a) PDMS, (b) 0.5 wt% MWCNT-alumina/ PDMS, (c) 1.0 wt% MWCNT-alumina/ PDMS, and (d) 1.5	186

wt% MWCNT-alumina/ PDMS.

- |             |   |     |
|-------------|---|-----|
| Figure 7.17 | DSC heating thermogram of (a) PDMS, (b) 0.5 wt% MWCNT-alumina/ PDMS (c) 1.0 wt% MWVNT-alumina/ PDMS, and (d) 1.5 wt% MWCNT-alumina/ PDMS.               | 188 |
| Figure 7.18 | Linear thermal expansion coefficient of (a) PDMS, (b) 0.5 wt% MWCNT-alumina/ PDMS (c) 1.0 wt% MWVNT-alumina/ PDMS, and (d) 1.5 wt% MWCNT-alumina/ PDMS. | 191 |
| Figure 7.19 | Expansion ratio of (a) PDMS, (b) 0.5 wt% MWCNT-alumina/ PDMS (c) 1.0 wt% MWVNT-alumina/ PDMS, and (d) 1.5 wt% MWCNT-alumina/ PDMS.                      | 192 |

## LIST OF ABBREVIATIONS

APCVD	Atmospheric Pressure Chemical Vapour Deposition
BET	Brunauer-Emmet-Teller
BJH	Barret-Joyner-Halenda
CNT	Carbon Nanotubes
CTE	Coefficient of Thermal Expansion
CVD	Chemical Vapour Deposition
DFT	Density Functional Theory
DSC	Differential Scanning Calorimetry
DTG	Derivative Thermogravimetric
EDX	Energy Dispersive X-Ray Spectroscopy
FESEM	Field Emission Scanning Electron Microscope
FTIR	Fourier Transform Infrared Spectroscopy
HDPE	High Density Polyethylene
HRTEM	High Resolution Transmission Electron Microscopy
ICSD	Inorganic Crystal Structure Database
IUPAC	International Union of Pure and Applied Chemistry
LED	Light Emitting Diodes
LPCVD	Low Pressure Chemical Vapour Deposition
MWCNT	Multi Walled Carbon Nanotubes
PDMS	Polydimethylsiloxane
PECVD	Plasma Enhance Chemical Vapour Deposition
RBM	Radial Breathing Modes
ROM	Rule of Mixture
SEM-AFM	Scanning Electron Microscopy-Atomic Force Microscopy

S <sub>A</sub>	Surface Area
S <sub>s</sub>	Specific Surface Area
SWCNT	Single Walled Carbon Nanotubes
TGA	Thermogravimetric Analysis
TPS	Transient Plane Source
XPS	X-Ray Photoelectron Spectroscopy
XRD	X-Ray Diffraction

## LIST OF SYMBOLS

$a$	Distance
$\alpha$	Thermal diffusivity
$\alpha_t$	Linear Thermal Expansion Coefficient
$\text{\AA}$	Angstrom
$AC_j$	Exposed Area of The Pore
$Al$	Aluminium
$Al_2O_3$	Alumina
$Al(NO_3)_3 \cdot 9H_2O$	Aluminium Nitrate Salts
$Al(OH)_4$	Hydroxoaluminates
$Ar$	Argon
$\vec{C}_h$	Chiral Vector
$^\circ$	Degree
$^\circ C$	Degree Celsius
$^\circ C / \text{min}$	Degree Celsius per Minute
$c$	Constant
$C$	Carbon
$C-C$	Carbon-Carbon
$CH_4$	Methane
$C_2H_2$	Acetylene
$C_2H_4$	Ethylene
$C_2H_6$	Ethane
$C_4H_{10}$	Butane-n
$C_{12}H_{27}AlO_3$	Aluminium Tri-Sec-Butoxide
$CH_3[Si(CH_3)_2O]_n$ $Si(CH_3)_3$	Polydimethylsiloxane

Cl <sub>2</sub>	Chlorine
cm	Centimetre
cm <sup>-1</sup>	Per Centimetre
C=O	Carbon-Oxygen
Co	Cobalt
COOH	Carboxylic
Co(NO <sub>3</sub> ) <sub>2</sub> .6H <sub>2</sub> O	Cobalt Nitrate
C <sub>p</sub>	Specific Heat Capacity
cP	Centi Poise
cSt	Centi Stokes
<b>D</b>	Diameter
D band	Defect Bands
D' band	Shift Defect Bands
dV(r)	Differential Pores Size Distribution
E	Young Modulus
ε <sub>0</sub>	Expansion Ratio
ε <sub>r</sub> '	Relative of the Permittivity
ε <sub>r</sub> ''	Loss Tangent of the Permittivity
eV	Electron Volt
f	Frequency
F <sub>2</sub>	Fluorine
Fe	Ferum
Fe(NO <sub>3</sub> ) <sub>3</sub> .H <sub>2</sub> O	Iron Nitrate
F/m	Farad per Meter
g/cm <sup>3</sup>	Density
g/l	Gram per Liter
G band	Graphite Band