

IP
Overview



Carbon Nanotubes

2008



FRINNOV

www.frinnov.fr

Contents

METHODOLOGY	7
INTRODUCTION	8
1. BRIEF OUTLINE OF THE CARBON NANOTUBE MARKET	9
2. PROTECTION STRATEGIES	11
2.1 Evolution of patent filings over time	11
2.2 Priority filings	12
2.3 Extensions	15
3. TECHNOLOGICAL MATURITY FACTORS	17
3.1 Analysis of the evolution of filings over time	20
3.2 Analysis of industrial filings over time	21
3.3 Analysis of the granting of patents in the United States	22
3.4 Evolution in the number of applicants	24
3.5 Summary	25
4. TOPOLOGY OF PATENTS IN THE SECTOR	28
4.1 Segmentation of patents by application	28
4.2 Segmentation of patents by IPC code	29
5. APPLICANTS	33
5.1 Analysis of the major applicants within the overall portfolio	33
5.1.1 Major applicants	33
5.1.2 Collaborations	35
5.1.3 Protected topics	37
5.2 The pioneers (priority filings up to 2000)	41
5.2.1 Pioneer applicants	41
5.2.2 Their collaborations	43
5.2.3 Topics protected by the pioneer applicants	44
5.3 Later applicants (2001 to present)	46
5.3.1 Major applicants	46

5.3.2 Collaborations	48
5.3.3 The topics protected by later applicants	49
6. THE INVENTORS IN THE FIELD	50
6.1 The most prolific inventors	50
6.2 The experts	51
6.3 Inventors who have changed affiliation	53
6.4 The pioneer inventors	55
6.5 Later inventors	57
6.6 Emerging inventors	57
6.7 Description of key inventors	58
6.8 Research topics for the selected inventors	59
CONCLUSIONS	62

List of Tables and Figures

FIGURE 1 – CNT MARKET EVOLUTION PROSPECTS BY FIELD OF ACTIVITY	10
FIGURE 2 – EVOLUTION OF PATENT FILINGS OVER TIME	12
FIGURE 3 – MAP OF PRIORITY FILINGS	13
FIGURE 4 – MAP OF PRIORITY FILINGS / ZOOM ON ASIA	14
FIGURE 5 – EVOLUTION OF PRIORITY FILINGS OVER TIME	14
FIGURE 6 – MAP OF EXTENSIONS	15
FIGURE 7– EVOLUTION OF EXTENSIONS OVER TIME	16
FIGURE 8 –MARKET LIFE CYCLE	17
FIGURE 9 –TECHNOLOGY LIFE CYCLE	18
FIGURE 10 – TECHNOLOGY VS. MARKET	19
FIGURE 11 – EVOLUTION OF THE NUMBER OF FILINGS OVER TIME	20
FIGURE 12 – EVOLUTION OF THE BREAKDOWN OF INDUSTRIAL PATENTS	21
FIGURE 13 – EVOLUTION OF THE GRANTING OF US PATENTS OVER TIME	22
FIGURE 14 – EVOLUTION OF THE GRANTING OF US PATENTS OVER TIME	23
FIGURE 15 – EVOLUTION OF THE NUMBER OF APPLICANTS	24
FIGURE 16 – PHASE DIFFERENCE	26
FIGURE 17 – SEGMENTATION OF THE CARBON NANOTUBE PATENTS PORTFOLIO	29
FIGURE 18 – BREAKDOWN OF THE MAIN IPC CODES APPEARING IN PATENT APPLICATIONS FILED IN 2006	30
FIGURE 19 – MAJOR APPLICANTS IN THE FIELD	33
FIGURE 20 – BREAKDOWN OF THE PATENT PORTFOLIOS BY APPLICANT	34
FIGURE 21 – MAJOR COLLABORATIONS	35
FIGURE 22 – TOPICS OF THE MAJOR PLAYERS	38
FIGURE 23 – BREAKDOWN OF THE MAJOR IPC CODES OF THE MAJOR PLAYERS	39
FIGURE 24 – THE MAJOR PIONEER APPLICANTS	41
FIGURE 25 – INITIAL COLLABORATIONS	43
FIGURE 26 – TOPICS PROTECTED BY THE PIONEER APPLICANTS	44
FIGURE 27 – MAJOR APPLICANTS FROM 2001 TO THE PRESENT	46
FIGURE 28 – COLLABORATIONS	48
FIGURE 29 – TOPICS PROTECTED BY LATER APPLICANTS	49
FIGURE 30 – EVOLUTION OF THE FILINGS OF THE MAJOR INVENTORS OVER TIME	50
FIGURE 31 – EVOLUTION OF FILINGS BY “EXPERT INVENTORS” OVER TIME	50

FIGURE 32 – INVENTORS WHO HAVE CHANGED AFFILIATION	50
FIGURE 33 – THE MAJOR TEAMS	50
FIGURE 34 – TOPICS OF THE SELECTED INVENTORS	50
TABLE 1 – CARBON NANOTUBE MARKETS (SOURCE: FREEDONIA GROUP)	9
TABLE 2 – FILINGS OF PIONEER APPLICANTS OVER TIME	42
TABLE 3 – FILINGS OF THE MAJOR PLAYERS OVER TIME	47
TABLE 4 – LIST OF THE MOST PROLIFIC INVENTORS	50
TABLE 5 – LIST OF EXPERTS	52
TABLE 6 – THE MAJOR INVENTORS	55
TABLE 7 – THE FILINGS OF THE MAJOR INVENTORS OVER THE PERIOD 2001-PRESENT	57
TABLE 8 – EMERGING INVENTORS	58

Summary

APPENDICE 1 - SEGMENTATION BY APPLICATION	66
Composites - 1048 patents	67
Medical and cosmetics - 404 patents	70
Sensors - 351 documents attribués	73
Memories - 191 patents	75
Display - 1292 patents	77
Batteries and Fuel Cells - 574 patents	80
Transistor - 383 patents	82
Gas storage - 177 patents	85
Microscopy - 277 patents	88
Photovoltaic - 78 patents	91
Heat exchanges - 174 patents	93
CNT Synthesys - 2180 patents	95
APPENDICE 2 – MAIN INVENTORS OVERALL TEAMS	98
Fan Shou-Shan	99
Iijama Sumio	100
Richard Smalley	101
Nakayama Yoshikazu	102
Toru Noguchi	103

ORDER FORM

Complete, sign and send this order form by email ipoverview@fist.fr or by fax +33 (0) 1 40 51 78 58
or purchase your report directly on line <http://www.frinnov.fr>

Delivery Information

Title: Last Name: First Name:
Company:
Email: Phone:
Address:
.....
Zip: City: Country:

Overview

Billing address (if different)

.....
.....
.....

I hereby state that I have the authority to place orders for the above mentioned company (if applicable) and accept and understand Frinnov's Terms and Conditions of Sale accessible on line: <http://www.frinnov.fr>

Date:

Signature:

Please take my order for the following report

Qty	Description	Price Ea.	Total
1	IP Overview "Carbon Nanotubes"	1 000 €	1 000 €
VAT (19.6%)			196 €
Total			1 196 €

Payment method

- Cheque payable to FIST
- Bank transfer: BNP Paribas, Paris AG-Centrale Entreprises, Bank code: 30004, Branch code: 00818, Account No: 00021375689 27

RIB : 30004 00818 00021375689 27
IBAN : FR76 3000 4008 1800 0213 7568 927
SWIFT / BIC : BNPAFRPPPPVD

For EU Member (outside France), kindly state your VAT number:



FRINNOV

www.frinnov.fr