Figure Captions

Fig. 1.1	Various forms of carbon: diamond, fullerene, graphite, and nanotube2
Fig. 1.2	TEM images of a single-walled carbon nanotube (SWNT) and multi-walled
	carbon nanotubes
Fig. 2.1	(a) an "armchair" tubule, (b) a "zigzag" tubule, and (c) a "chiral" tubule7
Fig. 2.2	(a) The chiral vector OA is defined on the honeycomb lattice of carbon atoms by
	unit vectors a_1 , a_2 and the chiral angle è with respect to the zigzag axis. (b)
	Possible vectors specified by the pairs of integers (n,m) for general carbon tubules,
	including zigzag, armchair, and chiral tubules
Fig. 2.3	Schematic illustration of the arc-discharge system10
Fig. 2.4	Oven laser-vaporization apparatus11
Fig. 2.5	Schematic illustration of the chemical vapor deposition (CVD) system13
Fig. 2.6	A single semi-conducting nanotube is contacted by two electrodes. The Si
1.00	substrate, which is covered by a layer of SiO ₂ 300nmthick, acts as a back-gate14
Fig. 2.7	Use of a MWNT as AFM tip. VGCF stands for Vapour Grown Carbon Fiber. At
0.22	the centre of this fiber the MWNT forms the tip15
Fig. 2.8	Schematic diagram of a field emission cell19
Fig. 2.9	Diagram of potential energy of electrons at the surface of a metal
Fig. 2.10	Diagram of the potential energy of electrons at the surface of an n-type
	semiconductor with field penetration into the semiconductor interior23
Fig. 2.11	Schematic diagram of a cell in a FEA. The emitter height is denoted by h, the gate
	aperture diameter by d, and the tip curvature by r23
Fig. 3.1	Schematic diagram of microwave plasma chemical vapor deposition (MPCVD)
	system
Fig. 3.2	The flow chart of experimental procedures

Fig. 3.3	Schematic diagram of Raman equipment
Fig. 3.4	Schematic diagram of the instrument for field emission measurement
Fig. 4.1	SEM images of the as-deposited specimens with catalysts synthesized by screen
	printing method, (a) cross-section view; (b) top wiew. The insect diagram is the
	magnification
Fig 4.2	SEM images of various surface of hydrogen plasma pretreatment for dirrerent time:
	(a) for 5 min, (b) for 15 min, (c) for 30 min, (d) for 45 min. The insect diagram is
	the minsification
Fig. 4.3	SEM images of different methane concentration under the growth condition at 150
1	W and 6 Torr for 30 min, (a) $H_2/CH_4=40/10$ sccm, (b) $H_2/CH_4=20/10$ sccm, (c)
1.5	H ₂ /CH ₄ =10/10 sccm
Fig. 4.4	I_D/I_G ratio varied with H_2/CH_4 ration of 150 W and 6 Torr for 30 min37
Fig. 4.5	Raman spectrum varied with different flow rate and data of I_D/I_G ratio and I_D/I_G
- 23	datd
Fig. 4.6	SEM images of different methane concentration under the growth condition at 200
1.00	W and 6 Torr for 30 min, (a) $H_2/CH_4=40/10$ seem, (b) $H_2/CH_4=20/10$ seem, (c)
1	H ₂ /CH ₄ =10/10 sccm
Fig. 4.8	I_D/I_G ratio varies with different growth time of $H_2/CH_4 = 10/1045$
Fig. 4.9	TEM images of carbon nanotubes. (a)herringbone-like structure, (b)carbon
	nanonfiber-like structure
Fig. 4.10	HRTEM images of carbon nanotubes
Fig. 4.11	EDX of the matal particle at tip of the carbon nanotubes
Fig. 4.12	Field electron emission properties of CNTs by solution deposition method on
	diode structure
Fig. 4.13	SEM images of the as-deposited specimens with catalyst synthesized by screen
	printing method. (a) cross-section view; (b) top wiew

- Fig. 4.15 SEM images of different Methane Concentration under the growth condition at 200 W and 6 Torr for 30 min, (a) $H_2/CH_4=40/10$ sccm, (b) $H_2/CH_4=20/10$ sccm, (c) $H_2/CH_4=10/10$ sccm.
- Fig. 4.16 I_D/I_G ratio varies with H_2/CH_4 ration of 150 W and 6 Torr for 30 min......54

- Fig. 4.19 I_D/I_G ratio varied with different growth time of $H_2/CH_4=10/10$ under 150 W and 200 W......60
- Fig. 4.21 HRTEM images of carbon nanotubes, (a) at the tip, (b) at the body......62
- Fig. 4.23 Field emission properties of CNTs by sol-gel method on diode structure.......64

Table Captions

