List of Figures

igures	Title	page
1.1	L-DOPA synthesis	2
1.2	Some example of drugs used in pharmaceutical industry	2
1.3	Applications of ethyl lactate	3
2.1	Chirality	5
2.2	Cinchona alkaloids	6
2.3	Processes for obtaining enantiopure compounds	7
2.4	Homogeneous catalysis versus heterogeneous catalysis	7
2.5	Systematic representation of asymmetric catalysis	8
2.6	Dimensions of carbon materials	9
2.7	Hydrogenation reaction	10
3.1	Graphical representation of the activation process and metal loading on carbon materials	21
3.2	Graphical representation of the preparation of metal loaded carbon nanotubes by a modified impregnation method	21
3.3	Graphical representation of the preparation of Pt HNC/MWCNT by using the Tw20 phase	22
ر.ر	transfer reagent	24
3.4	Typical preparation of various chiral polyamide and Pt/Chiral polyamide compounds of catalyst preparation (a) Aqueous solution of chiral polyamide added to Teflon stencil, (b)	24
	Aqueous H_2 PtCl ₆ solution added to chiral polyamide, and (c) Reduction of Pt (IV) to Pt (o)	25
	using high pressure hydrogen	25 25
2 E	Preparation of F-CD-BF ₄	25 36
3·5	Preparation method of F-CD-BF ₄ /Pt/MWCNT and F-CD-BF ₄ /MWCNT	30
3.6		20
3.7	SEM images of (a) activated carbon, (b, c) Pt/AC, (d) CF, (e, f) Pt/CF, (g) graphene, (h, i)	29
- P	Pt/graphene, (j, k) MWCNT, and (l) Pt/MWCNT	20
3.8	EDX mapping of (a) Carbon nanotube, (b) Carbon, (c) Oxygen, (d) Pt, and (e) Spectrum of carbon nanotube	29
2.0		30
3.9	SEM images of (a, b) chiral polyamide and (c, d, e and f) Pt/Chiral polyamide	20
3.10	EDX mapping of (a) Pt/Chiral polyamide, (b) Carbon, (c) Oxygen, (d) Pt, and (e) Spectrum of Pt/Chiral polyamide	30
3.11	SEM images of (a) Selectfluor, (b) F-CD-BF ₄ , (c, d) F-CD-BF ₄ /MWCNT, and (e, f) F-CD-BF ₄ /Pt/MWCNT	31
3.12	EDX mapping of (a) F-CD-BF4/MWCNT, (b) Carbon, (c) Oxygen, (d) Fluorine, and (e) Spectrum of F-CD-BF ₄ /MWCNT	31 32
3.13	TEM images of (a) Pt/AC, (b) Pt/CF, (c) Pt/Graphene, and (d) Pt/MWCNT	
3.14	HRTEM images of (a and d) Pt HNC/ MWCNT, (b and e) Pt HNC/Graphene, and (c) Pt HNC/ CF	33
	(f) image exhibiting high resolution lattice fringes of Pt (111)	34
3.15	HRTEM images of catalysts I-IV (a-e) 100 nm and (f-j) 10 nm	
3.16	HRTEM images of (a, b and c), Selectfluor/MWCNT, (d, e) F-CD-BF ₄ /MWCNT, and (f, g, h and i) F-CD-BF ₄ /Pt/MWCNT	35
3.17	XRD patterns of (a) Carbon fiber and Pt/CF, (b) Graphene and Pt/Graphene, (c) MWCNT and	36
,	Pt/MWCNT, and (d) Activated carbon and Pt/Activated carbon	36
3.18	XRD patterns of (a) Pt HNC, and (b) Pt HNC/C	37
3.19	XRD patterns of (a) Chiral polyamide and (b) Catalyst V	37
3.20	1D and 3D AFM images of (a and d) Pt/MWCNT, (b and e) Pt/graphene, and (c and f) Pt/CF)/
3.21	CV response of plane electrode, functionalised carbon materials and Pt loaded carbon	38
J-2.	materials	39
3.22	FTIR spectra of (a) Functionalized carbon materials and (b) Pt loaded carbon materials))
3.23	FTIR spectra of (a) Chiral camphoric dichloride, (b) Chiral polyamide, and (C) Pt loaded chiral	39
ر2۰ر	polyamide	40
3.24	adsorption-desorption isotherms of (a) Pt/AC, (b) Pt/MWCNT, (C) Pt/Graphene, and (d) Pt/CF	70
J•2¬	DRS of MWCNT, Pt/MWCNT, Pt/Cinchonidine/MWCNT, Cinchonidine,	41
3.25	Cinchonine, Pt/Graphene and Pt/CF	7'
3.26	TGA analysis of (a) AC and Pt/AC, (b) MWCNT and Pt/MWCNT, (c) Graphene and Pt/Graphene,	42
۰.۷۰	and (d) CF and Pt/CF	42 43
3.27	Raman spectra of (a) Pt/AC, (b) Pt/MWCNT, (c) Pt/Graphene, and (d) Pt/CF	43 44
3.28	F19 NMR spectra of (a) F-CD-BF4, and (b) Selectfluor	77
J	,	

3.29	(a) CD spectra of D-camphoric acid, L-camphoric dichloride, poly 5, and catalyst V, and	44
	(b) UV-Vis spectra of poly 5 and catalyst V	45
3.30	GPC chromatogram of poly 5	47
3.31	Asymmetric hydrogenation reaction of α -ketoesters	48
4.1	Asymmetric hydrogenation reaction of methyl pyruvate	49
4.2	Asymmetric hydrogenation reaction of methyl pyruvate over Pt/C	52
4.3	Asymmetric hydrogenation reaction of α-ketoester over Pt (111) HNC/C	54
4.4	Asymmetric hydrogenation reaction of various α -ketoester over Pt (111) HNC/MWCNT	56
4.5	Asymmetric hydrogenation of ethyl 2-oxo-4-phenylbutanoate	
4.6	Intermediate structure of asymmetric hydrogenation reaction of methyl pyruvate with	59
	cinchonidine on the catalyst surface	60
	A time depend 1H NMR studies of interaction between cinchonidine and methyl pyruvate	
	NMR spectra of (a) H5' and H8' protons and corresponding plot of chemical shift versus	
4.7	reaction time, (b) NMR spectra for H9 proton and corresponding plot of chemical shift versus	
4.8	reaction time, and (c) NMR spectra of H2 and H6 proton and corresponding plot of chemical	60
4.9	shift versus reaction time	62
4.10	Possible interactions between Pt, chiral polyamide and substrate	63
4.11	HRTEM images of (a, b) Catalyst I, (c, d) Catalyst III, and (e, f) Catalyst V	64
4.12	Mechanism of asymmetric hydrogenation reaction	66
5.1	Typical nucleophilic allylation reactions of imine and aldehydes	66
5.2	Allylation reaction of imines	69
5.3	Homogeneous and heterogeneous catalysts used the reaction	