

Contents

1	Introduction	1
1.1	Modulating the Performance of Heterogeneous Catalysts	1
1.1.1	Size Effect	1
1.1.2	Surface Structure	4
1.1.3	Support Effect	6
1.1.4	Promotion Effect of Secondary Components	8
1.2	Motivation and Conception of Thesis	10
	References	11
2	Experimental Section	17
2.1	Model Samples and Precursors of Supported Nanoparticles	17
2.2	UHV Systems	17
2.2.1	Omicron Multi-nanoProbe System	17
2.2.2	Deep Ultraviolet Photoemission Electron Microscopy System	18
2.2.3	Leybold XPS System	19
2.3	Experimental Methods of Model Systems	20
2.4	Experimental Methods of Supported Nanoparticles	21
3	Construction and Reactivity of Pt–Ni Catalysts	23
3.1	Motivation	23
3.2	Pt–Ni Model Catalytic Systems	24
3.2.1	Preparation of Various Ni–Pt(111) Structures	24
3.2.2	Interfacial Catalysis on NiO _{1-x} /Pt(111)	28
3.2.3	Synergetic Effect of Surface and Subsurface Ni	31
3.3	Supported Pt–Ni Nanoparticle Catalysts	32
3.4	Reasonable Design of Pt–Ni Bicomponent Catalysts	37
3.5	Summary	38
	References	39

4	Modulating the Structure and Reactivity of Pt–Ni Catalysts	43
4.1	Introduction	43
4.2	Ni–Pt(111) Model Catalytic Systems	44
4.3	Pt–Ni/CB Nanoparticle Catalysts	48
4.4	Summary	56
	References.	57
5	Comparison of Pt–Fe and Pt–Ni Catalysts	59
5.1	Introduction	59
5.2	FeO _x /Pt(111) Model Catalytic Systems	60
5.3	NiO _x /Pt(111) Model Catalytic Systems	62
5.4	Pt–Fe/CB and Pt–Ni/CB Nanoparticle Catalysts	64
5.5	Summary	67
	References.	67
6	Reactivity of Graphene-Confined Pt(111) Surface.	69
6.1	Introduction	69
6.2	Preparation of Graphene on Pt(111) Surface.	70
6.3	CO Intercalation	72
6.4	The Confinement Effect of Graphene	78
6.5	In Situ Visualizing Single-Channel Reaction	82
6.6	Summary	85
	References.	86
7	Conclusions	89

Construction and Reactivity of Pt-Based Bi-component
Catalytic Systems

Mu, R.

2017, XII, 90 p. 64 illus., 60 illus. in color., Hardcover

ISBN: 978-3-662-55242-1