

Index

a

- acetic anhydride 210, 211
- acetylides
 - propargylamines 132
 - propargylic alcohols 132
 - $Zn(OTf)_2$ and tertiary amines 132
- acyl sulfur ylides 34
- α -alasken-8-one 231
- alcoholysis 9
- aldehydes oxidative transformation 38–40, 42
- aldol and Mukaiyama-alcohol reactions
 - acetophenone derivatives 120
 - diazo compounds 123
 - Fostriecin 120
 - hydroxymethylation, cyclohexanone 122
 - sugars, prebiotic environment 122
 - zinc-proline complex 121
- aliphatic ketones 7, 14
- alkenes oxidative transformation 34, 35, 37, 38
- alkylation, Grignard reagents 129, 130
- alkylmagnesium chloride 293
- alkynes, intramolecular hydroamination of 104, 108
- allenylic alcohols 131
- N*-(1-allylcyclohexylmethyl)benzylamine, cyclization of 96, 97, 99
- amides
 - primary, *see* primary amides
- aminoalkynes 151, 152
- 2-amino-4-(indol-3-yl)-4*H*-chromenes 172, 173
- aminolysis 9
- aminoolefins, $ZnEt_2$ 111–113
- Aminotroponiminate (ATI) zinc complex
 - aminoalkynes and aminoalkenes 94
 - diisopropyl, $ZnMe_2$ 93

- immobilization 101, 103
- mesoporous silica 101–104
- phenyl and bis(trimethylsilyl)amide 99
- ring, catalytic activity 97
- aminotroponimines ligand library 95, 96
- anti*-Markovnikov 83
- apoptolidin A 264
- aromatic ketones 7
- aspergillide B 255, 257
- (+)-aspergillide C 224
- aspidospermidine 222
- (+)-asteriscunolide 250
- asteriscunolide D 255
- asymmetric Friedel–Crafts alkylations
 - chiral bipyridine-zinc(II) complex 79, 80
 - chiral diamines/thiourea-zinc(II) complexes 78
 - chiral dinuclear-zinc(II) complexes 73, 74
 - chiral *N,N'*-dioxide-zinc(II) complexes 74, 77
 - chiral (R)-BINAM based Imine-zinc(II) precatalysts 77
 - chiral oxazoline/imidazoline-zinc(II) complexes 64, 67–72
 - chiral Schiff base-zinc(II) complex 77
- asymmetric hydrosilylation, C=O bonds 14–19
- aza-Henry reactions 126
- azides
 - Boc-protected amines 160
 - *N*-bromosuccinimide (NBS) and trimethylsilyl 161
 - diazoacetate compounds 162
 - dienyl, pyrroles 160, 161
 - di-*tert*-butyl dicarbonate and sodium 160
 - homopropargyl 161
 - 1*H*-tetrazoles 160
 - 1,5-triazole 161

- azides (*contd.*)
 - trimethylsilyl 159
- 2-azetidinones 12

- b**
- bafilomycin A₁ 257
- Beckmann rearrangement 40
- benzannulation reactions,
 - o-alkynylbenzaldehydes 137, 138
- β-N-benzyl-2,2-diphenylpent-4-en-1-amine 100
- N-benzyl-*N*-methylphedrinium dibromodichlorozincate 14
- BI 653048 130, 246
- bi- and tricyclic 1,2-dihydroquinoline 106, 109, 154
- (+)-boronolide 248
- brass 3
- brevenal 228, 242
- brevetoxin A 268
- (-) brevisin 240
- bronze 3
- bryostatin 237
- bryostatin 16 240
- buddledone A 221
- bullatacin 234
- 1-butyl-3-methylimidazolium bromide (BMIMBr) 197

- c**
- callipeltoside aglycon 260
- callipeltosides 238
- carbometallation 279
- carbon dioxide (CO₂)
 - and diols 200
 - copolymerization 180
 - cyclic carbonates 179
 - and epoxides, *see* epoxides and CO₂
 - global climate 179
 - poly(propylene carbonate) (PPC) 180
 - propylene oxide (PO) 180
- carbon–carbon (C–C) bond formation
 - aldol and Mukaiyama-aldol reactions, *see* aldol and Mukaiyama-aldol reactions
 - allylic alkylation 141
 - aziridines 141, 142
 - description 119, 120
 - enynone and indole 141
 - Michael addition 123–125
- carbonyl compounds
 - aldehydes 156
 - imines 156
 - nitriles 156
 - polycyclic benzimidazole derivatives 157
 - pyrroles 156
 - Zn(ClO₄)₂·6H₂O 156
- C–X bonds (X = O, N and S), oxidative transformation 42–45, 47, 48
- N,S*-chelating ligands 17
- chemoselective acylation, alcohols and amino alcohols 168
- chemoselective hydrosilylation 6, 11, 12
- chemoselective Zn-catalyzed hydrosilylation, esters 10
- chiral (R)-BINAM based imine-zinc(II) precatalysts 77
- chiral *N,N'*-dioxide-zinc(II) complexes 74, 77
- chiral bipyridine-zinc(II) complex 79, 80
- chiral bisoxazolines (Box) 64
- chiral diamines/thiourea-zinc(II) complexes 78
- chiral dinuclear-zinc(II) complexes 73
- chiral macrocyclic amines, thermodynamically stable 18
- chiral oxazoline/imidazoline-zinc(II) complexes 64, 67–69, 72, 73
- chiral Schiff base-zinc(II) complex 77, 78
- chloranthalactone F 224
- chloroesters 171
- citridone A 264
- C–N bond formations 298
- Conia-ene-type cyclization 136
- cross-coupling reactions
 - alkenes and alkanes 295
 - aryl zinc chloride 287
 - C(sp) and C(sp³) 285
 - C(sp³)–C(sp³) 134
 - C–N bonds 296
 - classical 276
 - diorganozinc reagents 293, 294
 - 2,2-disubstituted propionamides 296, 297
 - electrophiles 283
 - heteroaromatic compounds 292
 - iron-catalyzed 289
 - MeZnCl 280
 - organometallic zinc and indium reagents 294
 - tetramethylethylenediamine (TMEDA) 289
 - tin enolates and α-haloketones 133
 - trideoxypropionate 134
- cross-dehydrogenative coupling, propargylamines 139
- C(sp²)-nucleophiles
 - acridines 291
 - diorganozincs 288
 - heteroaromatic compounds 291

- homo-coupling, phenylzinc chloride 287
 - iron-catalyzed C–H functionalization 289, 290
 - palladium-catalyzed homo-coupling, bromides 287, 288
 - C(sp³)-nucleophiles
 - diorganozinc reagents 293
 - diphenylzinc and diisopropylzinc 293
 - organometallic zinc and indium reagents 293, 295
 - palladium catalyst and α -halocarbonyl compounds 293
 - cyanocycline A 226
 - cyclic carbonates 196, 197
 - cycloaddition 199
 - cycloaddition reactions
 - azomethine ylides 128
 - cyclobutanones 129
 - Diels–Alder reaction 128
 - 1,3-dipolar 128
 - 2-vinyl indoles, nitroalkenes 128
 - cycloisomerization reaction 165
 - cyclopropanation reactions 140, 166
 - cyclopropylfurans 174
- d**
- Darzens-reaction 34
 - debilisone C 257
 - debromoflustramine B 227
 - (–)- Δ^9 -tetrahydrocannabinol 226
 - density functional theory (DFT) 18
 - depolymerization
 - polyethers, *see* polyethers
 - polyethylene terephthalate 212, 213
 - polylactic acid (PLA) 213
 - polysiloxanes 214, 215
 - recycling technologies 207
 - deuterated silane (Si-D) 19
 - diamine ligands 14–16, 21, 22
 - dibromoagelaspongins 264
 - Diels–Alder reaction 128, 129
 - Diels–Alder/enolate cyclization 136, 137
 - diisopropyl aminotroponimine 93
 - β -diketiminate methyl zinc complexes 104, 106
 - β -diketiminato-zinc(II) 187
 - dinuclear zinc bis-ProPhenol complex 73
 - dinuclear zinc complex 73
 - diorganozincs 279
 - dipeptides 170
 - N-diphenylphosphinylimines 22
 - 1,3-dipolar cycloadditions 128
 - 2,3-disubstituted furans 172
 - dynemicin A 232

e

- electron-capture dissociation (ECD) 18
- electron-donating substituents 99
- electron-poor arene ring system 104
- electrophilic activation mechanism 37
- α,β -enones 34, 37
- ent*-durgamone 233
- epoxidation 34–38
- epoxides and CO₂
 - carboxylate systems 185
 - copolymerization 182
 - cycloaddition reaction 196
 - dicarboxylic acids 183
 - dihydric molecules 183
 - homogeneous catalysts, *see* homogeneous catalysts
 - polymerization mechanism 183
 - propylene oxide 183
 - ring opening 182
 - zinc succinate (ZnSA) 184
 - zinc(II) dicarboxylates 183
- epoxomicin 252
- epoxyketones 34
- esterification 40
- esters 40, 43, 46
- ethenetricarboxylates 158
- EtZn(n³-C₆H₆)|[CHB₁₁Cl₁₁].C₆H₆ catalyzed hydrosilylation 10

f

- fatty acid chlorides 209, 210
- first-row transition metals 33
- FK-506 238
- formamidine 7
- fostriecin 236, 248
- FR901464 234
- Frechet-type dendrimers 68
- Friedel–Crafts alkylations
 - 1,2-nucleophilic addition mechanism 59
 - racemic 60–63
 - reaction mechanism 60
- Friedel–Crafts reactions
 - acylation 58, 59
 - alkylations, *see* Friedel–Crafts alkylations
 - asymmetric 64, 67, 68, 71, 73, 74, 77–79
 - description 57
 - nucleophilic substrates 57
 - substrates 58
- α -functionalization, amides and ketones 282
- functionalized azetidines 13

g

- (–)-galanthamine 12, 262
- gambieric acid A 225

- gelsemine 240
- Gibbs free energies 191
- (+)-gigantecin 252
- glycidyl ether 195
- glycidyl propargyl ether 195
- glycopeptide 268
- goniodomycin A 262
- green chemistry 33, 39
- GV104326 (4-methoxytrinem) 227
- gymnocin-A 243

- h***
- Hemimorphite (zinc silicate) 1
- Henry reaction 126
- hetero-Diels–Alder reaction 171
- high-valence inorganic salts 33
- homoallylic alcohols 130
- homogeneous catalysts
 - alkoxide bond 191
 - asymmetric copolymerization 193
 - biorenewable resources 188
 - crystalline thermoplastic materials 194
 - cyclohexene oxide and carbon dioxide 192
 - β -diketiminato zinc(II) complexes 188
 - dinuclear anilido-aldimin zinc catalysts 189
 - dinuclear zinc catalyst 190
 - macrocyclic complex 190
 - phenoxide systems 185
 - phosphorous ligands 186
 - quantum chemical computations 191
 - zinc phenoxides 185
- 4*H*-pyran derivatives 173
- hydroamination
 - alkenes 83
 - alkenes and alkynes 150
 - aminoalkynes, Zn(OTf)₂ 85, 107
 - 3-amino-propyl vinyl ether 86
 - aminotroponiminate zinc complexes 152
 - decamethylid zincocene 152
 - diethylzinc and ZnX₂ 153
 - imidazoles 90
 - indoles 90, 91
 - metal catalysts 151
 - pyrazoles 90, 91
 - pyrazolines 90, 92
 - pyrroles 90
 - pyrrolidines 90, 92
 - reactions 10
 - secondary amines 89
 - styrenes 90, 92
 - Zn-BEA catalyst 86
 - Zn/K-10 catalyst 86
- hydroamination-C–H activation 107

- i***
- imino-aldol reactions 127
- in situ* ligand formation 19
- internal epoxides 197
- iodioetheration 38, 39
- ionomycin 243
- iron-catalyzed C–N bond formations 296, 298

- k***
- ketoesters 137
- α - and β -ketoesters 6
- ketones, zinc-catalyzed hydrosilylation 6, 7, 14, 15, 18
- Knoevenaggel condensation 77

- l***
- β -lactams 13
- laulimalide 251
- leucascandrolide A 252
- Lewis acid catalyst 57
- Lewis-acid catalyzed hydrosilylations 6
- liquid-liquid two-phase system 87
- lithium/magnesium zincates 279
- lycopodine 230
- (–)-lycoramine 12, 262
- (+)-lysergic acid 232

- m***
- Mannich reactions 127
- melinonine-E 221
- metal catalysts 1, 2
- metal costs 1, 2
- methylene-pyrrolidine 158
- N*-methyl-*N*-phenylhydrazine 89
- 3-methylene tetrahydrofurans 171
- micacocidin 238
- Michael addition reactions
 - asymmetric alkylation, 2-methoxyfuran 125

- 1,2-diaza-1,3-butadiene 124
- 1,3-dinitroalkane 124
- 2(5H)-furanone 125
- α -hydroxyketones 123
- neoflavone 125

n

- (–)-neodysiherbaine A 249
- neoflavones 125
- N*-(4-nitrobenzyl)-2,2-diphenylpent-4-en-1-amine 101
- nitroolefins 68
- (+)-nudulisporic acid F 236
- non-activated alkenes 103
- nonchiral hydrosilylation, carbonyl bonds 6–14

o

- oleyl alcohol 7
- organozinc halides
 - arylzinc halides, Grignard reagents 281
 - carbometallation 279
 - general method 277
 - Me_2Zn 280
 - metal-catalyzed exchange reactions 278
 - Schlenk equilibrium 280
 - transmetalation 277, 278
- organozinc reagents
 - description 277
 - diorganozincs 279
 - lithium/magnesium zincates 279
 - nucleophiles 275
 - organozinc halides 277–279
 - oxidative coupling, *see* oxidative coupling
- ortho-substituted aromatic substrates 7
- ortho-substituted β -nitrostyrenes 68
- ortho-substituted benzophenones 18
- oxidation reactions
 - description 33
 - zinc-catalyzed, *see* zinc-catalyzed oxidation reactions
- oxidative carboxylation 199
- oxidative coupling
 - alkylzinc reagents 285
 - $\text{C}(\text{sp}^2)$ -nucleophiles, *see* $\text{C}(\text{sp}^2)$ -nucleophiles
 - $\text{C}(\text{sp}^3)$ -nucleophiles, *see* $\text{C}(\text{sp}^3)$ -nucleophiles
 - $\text{C}(\text{sp})\text{-C}(\text{sp}^3)$ cross-coupling 284
 - C–N bond formation 296, 298
 - C–O bond formation 298
 - classic cross coupling 276
 - dibenzylidene acetone (DBA) 284
 - proposed mechanism 285
- oximidine II 255

p

- pactamycate 237
- pactamycin 237
- panaxytriol 255
- parvineostemonine 231, 233
- phenalenyl-based ligands 107
- phenylethyne 111
- phenylzinc halide, nickel-catalyzed homo-coupling reaction 282, 283
- phomoidride B 232
- (+)-phorbaside A 264
- (+)-phorboxazole A 228
- phorboxazole A 243
- phthiocerol 258
- poly(cyclohexene carbonate) (PCHC) 180
- polyaniline-supported zinc oxide 59
- polycarbonates
 - aldehydes and ketones 195
 - aliphatic, hydroxyl functional polycarbonates 195
 - functionalized cyclohexene oxides 194
 - zinc catalyst 195
- polycavernoside A 268
- polyethers
 - acetic anhydride 210, 211
 - fatty acid chlorides 209, 210
 - functionalities 208
 - polytetrahydrofuran (PolyTHF) 211
 - zinc(II) triflate 211
 - zinc-catalyzed cleavage, cyclic ethers 208
 - zinc-catalyzed depolymerization 208, 209
- polylactic acid (PLA) 213
- polymethylhydrosiloxane (PMHS) 6, 7, 16
- polytetrahydrofuran (PolyTHF) 211
- primary amides 39, 40
- primary aminoalkenes 110
- propargylic alcohols, zinc-catalyzed skeleton rearrangement 137, 138
- prostaglandin EP4 antagonist 233
- psymberin 221
- Pybim ligands 18
- pyrazoles 90, 91

r

- racemic Friedel–Crafts alkylation 60, 61, 63, 65
- radical reactions 134, 135
- β -receptor agonists (–)-denopamine and (–)-arbutamine 247
- redox-active ligands 50, 52, 53
- (+)-rogioloxepane A 238
- roseophilin 247
- (+)-(2*R*,6*R*)-*trans*- γ -irone 226

s

- salvileucalin B 240
 Schiff-base ligands 18
 silicones 214, 215
 silyl ethers 8, 14
 silyl-substituted furan derivatives 174
 Smithsonite (zinc carbonate) 1
 solandelactone E 225
 sp^3 C–H bonds oxidative functionalization 49–51
 Spalerite 1
 (–)-spicigerolide 260
 spirolactam 266
 spongistatins 219
 stereoselective radical reaction 38
 steric effects 95
 (*R*)-strongyloidiols A and B 260
 β -substituted non-activated secondary aminoalkenes 96
 (+)-sundiversifolide 266
 symmetric ethers 8

t

- tetra-*n*-butyl ammonium bromide (TBAB) 198
 tetranuclear zinc cluster 168
 teucvidin 220
 “transition” position of zinc, periodic table 3
 triarylmethanes 167
 trifluoromethyl ketones 123, 130, 246
 triolein (glyceryl trioleate) 7
 Tris(2-pyridylthio)methylzinc hydride 9

u

- undecachlorosulfolipid A 258
 α,β -unsaturated ketones 8, 9, 34
 (–)-ushikulide A 252

v

- (–)-virginiamycin M₂ 255
 VPC01091 222

w

- Wurtzite (zinc sulfide) 1

z

- zinc alkoxide 7
 zinc aminosalicylideneimine tetranuclear complexes 104
 zinc catalysts, organic transformations 1–3
 zinc hydride 7
 zinc organometallic compounds 104
 zinc-*O,S,S'*-ligand precatalysts 7
 zinc-carbene complexes 13

- zinc-catalyzed amide cleavage/esterification reaction 169
 zinc-catalyzed asymmetric hydrosilylation 16, 17
 zinc-catalyzed C–N bond formation
 – aminosulfonation, 4-ethyl anisole 162
 – azides and diazocompounds, *see* azides
 – cyclopropanes and epoxides 163, 164
 – description 149, 150
 – hydroamination, *see* hydroamination
 zinc-catalyzed C–O bond formation
 – cycloisomerizations 164
 – description 164
 – enynones and silanes 166
 – furans and furopyrimidine nucleosides 165, 166
 – furfuryl ethers 167
 – *N*-hydroxylamines 165
 zinc-catalyzed cascade reactions
 – bi- and tricyclic 1,2-dihydroquinoline 154
 – hydroamination/alkyne addition 154
 – propargylamides 155
 – terminal alkynes/Fischer indole sequence 154
 zinc-catalyzed chemoselective hydrosilylation 11–13
 zinc-catalyzed hydrosilylation 7
 – aldehydes to ethers 8
 – C=N bonds 19–23, 25
 – α - and β -ketoesters 6
 – ketones 6, 7, 14, 18
 – organic amides 11
 – α,β -unsaturated ketones 9
 zinc-catalyzed oxidation reactions
 – alcohols 42, 43
 – aldehydes oxidative transformation 38–43
 – alkenes oxidative transformation 34, 35, 37, 38
 – C–X bonds oxidative transformation 42, 43, 46–48
 – redox-active ligands 50, 52
 – sp^3 C–H bonds oxidative functionalization 49, 51
 zinc-catalyzed reductions, unsaturated compounds
 – hydrogenation 25, 27
 – hydrosilylation, *see* hydrosilylation
 – transfer hydrogenation 28, 29
 zinc-catalyzed transesterification reaction 169
 zinc-diamine catalyzed chemoselective hydrosilylation 14
 ZnBr₂-catalyzed [5 + 1] annulation of enamidines 158

Zn-catalyzed reductive silylation 14
Zn–Co double metal cyanides (DMCs) 14,
115
Zn(diamine)(diol) type complexes 18

Zn(2-ethylhexanoate)₂ catalyzed
hydrosilylation 6
Zn(OAc)₂-catalyzed hydrosilylation 8

