

Index

A

adatoms, 14, 97, 123, 125, 128, 130, 131, 140, 218, 219, 221, 231, 323, 356
additives, 16, 20, 61, 73, 127, 162, 182, 183, 199, 201, 214, 220, 221, 258, 259, 262, 268–271, 276, 277, 280, 284–289, 291, 293–295, 298–300, 303, 305, 306, 308–310, 316, 336, 338, 341, 342, 348, 357, 368
adhesion, 73, 101–104, 266, 271, 275, 277, 284, 291, 297, 298, 307, 314, 316
adions, 14, 125, 128–130
adsorption, 9, 17, 18, 70, 71, 103–105, 111, 125, 127, 132, 136–138, 140, 182, 186, 199, 201, 208, 219–221, 231, 233–235, 269, 271, 277, 320–325, 335, 337, 350
adsorption equilibrium, 235, 236
alternate current, 19, 190, 193–196, 198, 199, 314, 338, 339
aluminum, 259, 261, 262, 265, 268, 283, 284, 286–288, 301, 302, 304, 305, 360, 361, 366
amorphous alloys, 214, 220, 221
amplification of migration current, 89
antifriction materials, 254
antimony, 254, 255, 274, 278, 284, 300, 307, 310
asymmetry parameter, 59

B

barrier coating, 256
bismuth, 220, 254, 304, 309, 310, 327, 356
boundary layer, 91, 93, 166, 170
brass, 254, 271, 272, 278, 289, 307, 323, 357, 360, 371
breaking stress, 348, 349
brightening, 187, 234, 245, 252, 262
bronzes, 272, 273

burning, 314

Butler–Volmer equation, 115, 128, 129

C

cadmium, 19, 137, 220, 254, 255, 289, 294, 304, 305, 356, 371
chemical potential, 53, 60, 98, 123, 284
chromium, 19, 22, 24, 253, 254, 256, 257, 260, 271, 288, 295–301, 306, 312, 316, 356, 357, 371
cobalt, 211, 256, 257, 274, 280, 283, 295, 327, 346, 353, 356, 365, 371
codeposition, 20, 183, 205, 210, 214, 221, 224, 227, 232, 234–236, 239, 241, 242, 244–246, 249, 252, 280, 282, 293, 303, 317, 346, 349, 353, 372
collection efficiency, 96
compressive stress, 289, 356–359
concentration overpotential, 84, 85, 135, 149, 217, 275
conductivity, 15, 17–19, 21, 24, 147, 156, 162, 169, 176, 178, 203, 223, 234, 255, 256, 266, 267, 271, 273, 275, 277, 279, 286, 287, 290, 297, 311, 313, 327, 328, 336, 338, 339, 372
consecutive steps, 97
contact resistance, 21, 256, 272, 273, 279, 290, 307, 313, 330, 340, 341, 343–345, 371
contact spots, 343
contractometer, 359
copper, 2, 7, 15, 19, 24, 73, 96, 125, 137, 219, 220, 254–257, 261, 262, 265–273, 278, 279, 282–284, 287, 291, 294, 297, 300, 305–307, 310, 316, 320, 323, 324, 330, 332, 337, 338, 341, 342, 348, 354–356, 360, 361, 367, 369, 371, 372
covering power, 163, 297, 298
cracking, 258, 297, 300, 311, 313, 356, 362

current density, 4–13, 15, 17, 20, 21, 23, 24, 58, 60, 62–64, 69, 70, 74, 77, 78, 82–88, 90, 93, 94, 110, 113, 115, 116, 127, 128, 130, 132, 134, 136–138, 141, 144–148, 151, 152, 154, 155, 157, 161–163, 165, 166, 169–171, 173, 178, 180–183, 185, 190, 192, 193, 195, 197, 198, 202, 204, 206, 207, 216, 226–228, 230, 234–236, 241–247, 250, 258, 262, 267, 270, 275–277, 280, 283, 285, 286, 293, 294, 298, 299, 304, 307, 313–316, 319, 320, 335, 336, 349, 351, 355, 356, 366, 368

current efficiency, 12, 16, 18, 24, 73, 162, 174, 199, 201, 207, 213, 236, 248, 250, 258, 266, 276, 298, 299, 301, 302, 307, 308, 315, 368, 370

current thieves, 165

D

damascene, 268

Dawson's integrals, 120

Debye length, 77

decorative properties, 285, 291

degreasing, 17, 259, 260, 288, 361

dendrites, 83, 137, 176, 199, 201, 209, 306

depolarization, 12, 208, 219

diffractometry, 331

diffusion, 14, 15, 17, 18, 65, 77, 78, 80, 82, 84–86, 88–93, 107, 110, 111, 113–122, 126–130, 133, 140, 141, 143, 147, 161, 166, 170, 179, 181, 183, 184, 189–192, 194, 197–202, 204, 209, 214, 219, 221, 227–231, 254, 257, 271, 274, 277, 282, 288, 290, 291, 297, 307, 313, 326–329, 337, 345, 356, 357, 360, 361

diffusion layer, 18, 80, 93, 121, 127, 129, 130, 133, 149, 166, 170, 174, 178, 179, 181, 185, 187, 189–191, 193–200, 202, 203, 230, 241, 246, 247

diffusion overpotential, 84, 192

Discharge of Complexes, 73

double layer, 57, 61, 73

ductility, 21, 221, 229, 257, 268, 279, 290, 293, 294, 297, 315, 325, 328, 330, 335, 347–350, 352

E

electrical contacts, 2, 255, 272, 274, 279, 290, 313

electrical resistance, 21, 335, 336, 339

electroactive species, 3, 8, 14, 18, 58, 60, 66, 69, 70, 77, 79, 87, 88, 111, 113, 115, 127, 169, 179, 181, 189, 190, 192, 194

electrochemical equivalent, 4, 207, 224, 270, 299

electrochemical potential, 53, 219

electrode, 1, 2, 4–11, 14, 16–18, 20, 23, 24, 53–65, 69–74, 77–88, 90–96, 104, 105, 110–112, 141, 143, 145–158, 160–162, 165, 166, 169–171, 174, 180, 182, 184, 189–195, 197, 199, 201–204, 208, 210, 217, 219, 220, 226, 231, 262, 265, 269, 270, 277, 292, 312, 357, 367

electrode potential, 6–9, 11, 17, 55, 57, 61, 130, 136, 137, 147, 190, 191, 217, 221, 235, 241, 262, 277, 327, 361, 367

electrode processes, 10, 16, 94, 180, 189, 193, 227

electropolishing, 187, 262, 306, 332

elongation, 291, 346–352, 359

epitaxial growth, 21, 138, 320, 360

equilibrium potential, 58, 62–65, 67, 73, 74, 84, 85, 87, 105, 110, 112

exchange current density, 110

F

Faraday law, 203

ferromagnetic films, 345

Fokker–Planck equation, 107, 108, 111

Frank–Van-der-Merwe mechanism, 103

G

Galvani potential, 53–55, 60

grain, 123, 134–136, 141, 213, 214, 216, 226, 262, 282, 287, 293, 318, 319, 326, 328, 338, 346, 347, 349, 356, 370

grain boundaries, 21, 141, 201, 214, 216, 219, 245, 318, 319, 321, 325–328, 335, 336, 342, 346, 348, 349, 356

grain size, 20, 21, 134, 135, 141, 189, 201, 217, 220, 245, 262, 282, 293, 318–321, 326, 328, 331, 335, 336, 347, 349, 350, 352, 353, 371

H

Hall–Petch law, 349

hardness, 21, 189, 206, 221, 223, 229, 256, 272, 274, 279, 285, 289, 290, 295–298, 307, 313, 320, 325, 327, 328, 330, 335, 346, 349, 350, 352–355, 371, 372

heterogeneous nucleation, 99, 102, 103, 226

Homogeneous Nucleation, 98

Hume-Rothery's rule, 213

hydrogen evolution, 10–12, 16–18, 73, 81, 85, 139, 206, 213, 228, 249, 250, 252, 280, 291, 299, 302, 303, 311, 365

hydrogenation, 18, 219, 248–250, 258, 260, 285, 288, 291, 292, 297, 300, 304, 311, 313, 338

I

impedance, 56
impurities, 20, 21, 103, 125, 136, 137, 139,
140, 199, 201, 205, 227, 260, 271, 276,
277, 282, 283, 287, 288, 291, 294, 295,
314–317, 320, 322, 323, 325, 335–338,
341–343, 346, 348–350, 353–355, 357, 372
incorporation, 17, 20, 71, 125, 126, 128, 130,
182, 233–239, 242, 243, 245–249, 277,
322, 323, 325, 337, 349, 357
indium, 254, 304, 305, 307, 356
inhibition, 70, 71
instantaneous nucleation, 119–121
intercalation, 217, 219, 221, 231
intermetallics, 212–215, 220–223
internal stress, 16, 21, 258, 266, 268, 273, 279,
284, 288, 291, 293, 302, 303, 311–314,
327, 346, 355–357, 359
interstitials, 321, 326
iron, 21, 206, 220, 221, 256, 257, 260, 265, 276,
287, 290, 295, 301, 302, 305, 346, 356, 365

L

lead, 2, 67, 68, 71, 103, 116, 121, 122, 137,
220, 222, 254, 257, 258, 261, 271, 280,
294, 300, 302, 305–307, 309–311, 324,
327, 335, 336, 356, 357
leveling, 24, 121, 170, 172, 173, 175, 178,
182, 186, 187, 271, 293, 337
leveling power, 170, 181–183, 185, 186
Levich formula, 93
lifetime, 169, 255, 279
limiting potential distribution, 145
Luggin Capillary, 57

M

macrodistribution, 23, 178
magnetic coatings, 346
magnetoresistance, 229
mass transport, 80, 235, 239, 241, 242
mechanical mixture, 21, 213, 216, 217, 331
metastable phases, 221
microthrowing power, 170, 183
migration, 14, 77, 78, 84, 88, 89, 91, 143, 190,
326–328
mixed kinetics, 86, 87, 115, 161, 227, 231
morphology, 6, 9, 21, 99, 122, 124, 126, 127,
136–138, 140, 170, 211, 283, 318, 320,
324, 332
multilayers, 229

N

Nernst equation, 56, 62, 68, 70, 84, 86, 87
nickel, 2, 16, 19, 22, 24, 88, 220, 253–258,
262, 271–275, 280, 282, 283, 289–297,

299, 300, 302, 304, 307, 320, 322, 324,
330, 338, 340–342, 346, 349, 353, 356,
357, 360, 361, 365, 368, 371, 372
nucleation, 17, 97, 100–107, 109, 112–114,
118–123, 125, 130–132, 134–136, 139,
140, 198, 199, 201, 216–219, 225, 226,
229, 238, 282, 317, 319–321, 324, 325,
335, 357, 360, 365

O

overlap, 118–120, 122, 133, 209
overpolarization, 207, 208
overpotential, 63, 64, 70, 71, 73, 84, 85, 87,
90, 93, 98, 103, 105, 109–112

P

palladium, 24, 220, 255, 256, 258, 274, 278,
295, 296, 310, 311, 356, 368, 373
peeling, 297, 314, 356, 362–364
phase diagrams, 214–216
pickling, 260–262, 288, 361, 362
pitting, 16, 295, 307
platinum, 19, 55, 125, 253, 257, 282, 301, 311,
312, 314, 340, 346
polarizability, 11, 64, 73, 184
Polarization Curves, 62, 65
polarization field, 148, 149
porosity, 21, 272, 279, 282, 298, 300, 310,
312, 328, 338, 341, 342, 348, 365–367
preceding homogeneous step, 69
primary potential distribution, 144, 145
progressive nucleation, 120, 121
pulse, 112, 113, 190, 197–201, 229–231, 260,
271, 300, 338, 361

R

recrystallization, 312, 324, 328, 355
reference electrode, 55, 56
reflectance, 257, 277, 290, 298, 313
residence time, 20, 236–238
resistivity, 144, 178, 336–338, 340–343, 371,
372
rhodium, 253, 256, 257, 313, 314, 356
ring-disc electrode, 94
rotating disc electrode, 80, 94, 182
roughness, 4, 6, 10, 23, 24, 83, 92, 125,
140, 141, 169–173, 175, 176, 185, 186,
200, 202, 262, 314, 332, 342–344, 354,
360–362, 370
roughness coefficient, 4, 169

S

secondary microdistribution, 177
secondary potential distribution, 146

silver, 6, 15, 24, 55, 88, 113, 137, 219, 220, 253–258, 266, 272–279, 282–284, 307, 311–313, 324, 328, 330, 341, 352, 356, 368, 372

sinusoidal current, 190, 193

soft magnetic materials, 302

solderability, 254, 258, 266, 308, 309, 330, 368

solid solution, 21, 211–214, 216–223, 231, 249, 283, 296, 328, 331, 338, 371

stacking faults, 20, 201, 320–324, 328, 331, 332, 336, 348

Standard Hydrogen Electrode, 55

stannate, 273, 308–310, 361

stirring, 11, 18, 70, 80, 161, 259, 267, 269, 270, 281, 287, 293, 294, 308, 309, 336

Stranski–Krastanov mechanism, 104

sub-grains, 318, 320

sublayers, 229

subsequent chemical step, 70

substrate, 9, 11, 17, 18, 21, 22, 97, 99–102, 104, 112, 120, 136–139, 164, 165, 170, 176, 208, 211, 216–220, 231, 253–255, 257, 260, 266, 279, 288, 290–292, 296, 300, 304, 307, 319, 320, 325, 326, 330, 332, 339–341, 345, 346, 348, 350–367, 369–371

T

Tafel equation, 18, 93

Tafel Region, 64

Tafel slopes, 68

tarnishing, 260, 274, 344

tensile strength, 328, 346, 348, 352, 363

tensile stress, 22, 355–357, 359

texture, 318, 324, 325, 331, 346

throwing power, 24, 143, 158, 160, 200, 258, 266, 275–277, 280, 285, 289, 293, 297, 301, 305, 308

tin, 2, 220, 254–258, 260, 272, 273, 287, 296, 300, 304, 306–310, 330, 356, 368

true leveling, 173, 176

tunneling microscopy, 137, 219, 331

twin boundary, 323

twinning, 138, 139, 318, 321, 323–325

U

underlayers, 254–256

underpotential deposition, 9, 103, 218, 219, 229, 231

V

vacancies, 219, 321, 326–328, 332

Vegard's law, 212

Vetter equation, 67

Volmer–Weber mechanism, 103

W

Wagner number, 156–158, 166

wear resistance, 23, 206, 216, 229, 254, 256, 278, 279, 289, 290, 293, 296, 300, 310, 313, 347, 350, 355

X

X-ray, 20, 21, 212, 213, 223, 318, 321–324, 327, 328, 330–332, 359, 371

Z

Zeldovich equation, 107

Zeldovich factor, 108, 131

zinc, 2, 18, 19, 24, 254–262, 267, 271, 272, 282, 284–289, 294–296, 304, 307–310, 327, 330, 356, 361, 368

zincate, 262, 361

zincate treatment, 262