

Index

A

absorber layer 112 f
absorption index 105, 117
acoustoelectronics 3, 28 f
acoustomigration 173 f, 261 ff, 277 f
– experimental setup 267
– mechanism 262 f, 291
– stress induced 243, 264
– tests 268 f
activation energy 233 ff, 243 ff
adhesion 248 ff, 260, 266, 269, 272, 331
admittance measurements 268
allotaxy 63 f
alternating current 247
AMR sensors 367 ff
analytical TEM 160, 163 f, 166 f
antiferromagnetic coupling 287, 289,
291 ff
antiferromagnets 78, 80, 96
arc evaporation 151
atomic layer deposition 155, 249, 260
Auger electron spectroscopy 198, 207 ff,
332

B

B₄C 311, 316 f, 319 ff
bandgap 51 ff, 61, 64, 67
barrier 10 ff, 17 f, 25 ff, 51 f, 242 f,
248 ff, 266, 315 ff
beam steering 43
biaxial modulus 215, 218 ff, 222, 224 f
bidirectional 40, 42, 356
bilinear coupling 78
bilayer 22, 81, 95, 192 f, 219, 225, 251,
264, 270, 275, 296, 299
binding energy shift 210
biquadratic coupling 78
Black's equation 235 f

Blech effect 232, 238, 245
blocking temperature 284, 302, 304 f
Bragg's equation 110, 168 f, 177 f, 181 f,
191
Bragg peaks 182, 184, 192, 194
Bragg reflection 37 f, 109 ff
bulk acoustic wave 30 ff, 35, 39

C

C/C multilayers 320
capping layer 8, 13, 15, 21
carbon nanotubes 353
chemical composition 160 ff
chemical vapor deposition (CVD) 153 ff
– low pressure 154
– plasma enhanced 154
chirp filters 361
coherency strain 184, 188
constructive interference 113, 115 f, 118,
120
copper interconnect 241 ff, 249 ff, 274 ff
CORDIC algorithm 370
coupling 284 ff, 289 ff, 301, 305 ff, 308
– antiferromagnetic 284, 287 ff, 294 ff,
307
– bilinear 78
– biquadratic 78
– dipolar 305 f
– exchange 284 f, 295 f, 301 f, 307 ff
– Néel 78 ff, 284, 302, 305, 345
– orange peel 301, 305 f
– strength 241, 245, 251, 264, 267, 284,
297 f
coupling factor 34 f, 39, 42, 45
coupling-of-modes (COM) theory 41
crystal structure 49 f

D

damage analysis 234 ff, 272 ff
 damascene technique 12, 247
 Debye-Waller factor 116
 degradation mechanism 13, 18 f
 delocalize 74
 demixing 286
 depth profile analysis 207 f, 212 f
 detectivity 385
 diffraction 43, 104, 109 f, 118 f
 – contrast 163, 166
 – EBSD 177 ff
 – electron 168 ff, 177 f
 – X-ray 109 ff, 179 ff
 diffuse scattering 193
 diffusion 232 ff, 237 f, 240 f, 248 ff,
 290 ff, 315 f
 – barrier 12, 27, 147, 155 f, 186, 192 f,
 202, 213, 260, 266
 – drift 232 f, 263 f
 diffusion path 238 f, 243 f, 246
 – grain boundary 233 f, 238, 243 f, 246 f,
 264, 286, 290 f
 – interface 233 f, 243, 245 f, 250 f, 260
 – surface 233 f, 238, 251, 253 f, 258 ff,
 282 f, 313 ff, 317 f, 321 ff
 – volume 233 f, 243, 257, 264
 dipolar 75, 98
 direct current 151, 386
 DRAM 349, 351

E

e-beam evaporation 264, 270, 306, 313 ff,
 321
 EDXS 197 ff, 264 f
 efficiency 362, 373, 385, 387 f, 393 f
 electrical admittance 35, 42
 electrochemical deposition 9, 12
 electroless deposition 158 f
 electromigration 9, 15 ff, 21 f, 62, 173,
 232 ff, 243, 245 ff, 251 f, 260
 – accelerated test 236
 – alloying effect 240, 245
 – alternating current 247 f
 electron backscatter diffraction 177 ff
 electron beam evaporation 149 f
 electron diffraction 168 ff, 333 f, 339

electron emission 149, 208 f
 electron energy loss spectroscopy (EELS)
 198, 205 f
 electron microscopic specimen preparation
 161 f, 175 f
 electronic properties 50, 65
 electroplating 12 f, 157 f
 elemental distribution analysis 197 f, 205 f
 energy filtered TEM (EFTEM) 166 f, 289
 energy storage 36 f
 energy trapping 44
 equivalent circuit model 41
 EUV 104, 315, 317 f
 EUVL 104, 109
 evaporation 148
 – electron beam
 exchange bias 78 f, 94 f, 149 f

F

Fermi surface 88 f
 ferrimagnetic 75
 ferromagnets 72 f, 82 ff
 film strain 184
 focused ion beam (FIB) 162, 175 ff
 frequency shift 263, 273, 278
 Fresnel equation 106, 116

G

giant magnetoresistance (GMR) 85 ff,
 93 ff, 284 f, 291, 295, 367 ff
 glancing incidence reflection 107
 glow discharge optical emission
 spectrometry (GDOES) 207, 212 f, 253
 Goebel mirror 115, 323
 graded LSM 115
 gradiometer 369
 grain size 12 f, 15 ff, 23 f, 56, 69, 71
 group velocity 43
 growth stress 216

H

Hall effect 367
 High Resolution TEM (HRTEM) 164
 hillock 234, 238 ff, 244 f, 261, 272 f,
 276 f, 283
 hysteresis 287, 294, 298, 308 f
 hysteresis loop 294, 308

I

inlaid process 10, 15, 27, 350 f
in-plane 75, 86, 214 f, 246 f, 251, 285, 370, 392
integrated thermoelectric generator 392 f
interconnect 7, ff, 15 ff, 21 ff, 51, 62, 129, 231 ff, 240 ff, 243, 247 ff, 251 f, 258 ff, 266, 291, 324, 349, 353
– aluminium 240 ff, 272 ff
– copper 242, 248 ff, 255, 258 ff, 266, 270, 274 ff, 283 ff, 298, 349 ff
– degradation 17 ff
– 3D 353
– on-chip 349, 353, 392
– optical 353, 373 ff
– technology 349 ff, 362, 366 f, 372 f, 378, 384, 387 f, 390 ff
interdiffusion 250 f, 266, 295, 311, 314 ff, 320, 331
interdigital transducer 28 f, 39 ff, 43, 356 f
interface 17, 21, 23, 52, 55, 58 f, 62 f, 70, 79 f, 105, 119 ff
– interdiffusion 315 ff
– roughness 313 f
interlayer exchange coupling 76 f, 86
interphase 279
ion beam sputter deposition 314
ion plating 153
itinerant ferromagnetism 74

K

Kerr effect 287

L

ladder-type filter 360
Langmuir-Blodgett films 112
laser beam evaporation 150
lattice parameter 188 f, 224 f
layered synthetic microstructure (LSM) 104, 113 ff
leaky waves 39
lifetime measurement 234 f, 271 f
lift-off 261, 269 f
light-emitting diode 91, 102 f
light trapping 124, 127
low pressure CVD 154
luminescence 67

M

magnetic layer 283 ff, 295 ff
– tunnel junction 307 f
magnetic moment 71 ff, 79, 85
magnetic scattering 194 ff
magnetic switching 82, 98 f
magnetization 71 ff, 93 ff
magnetocurrent 101 f
magneto-electronics 71 ff
magneto-optical 194 ff, 366
magnetoresistance 71 f, 285, 291, 296, 305
– giant 85 ff, 284 f, 287, 291, 295
– tunnel 83 f, 295, 305, 307 f
magnetotransport 101, 285
magnetron sputter deposition 115, 119, 314
magnetron sputtering 145 ff
mass flux 234 f, 243
mass loading 35
mass thickness contrast 162
mesotaxy 63
metallization layer 266 f, 269 f, 282
microcooler 390, 393
microdiffraction 180 ff, 189, 190 ff
microprocessor 349, 351
microstructure 12 ff, 21 ff, 27, 56, 61, 68, 113, 116, 141 f, 154, 157 f, 179, 184, 216, 221 f, 224, 234, 241 ff, 249 g, 264, 266, 274, 288
minor loop 301, 308 f
mirror 321 f, 373 ff, 380
Mo/Si 310 ff, 314 ff, 321
modeling 20 f, 40, 42, 91, 96
MOKE 195
molecular beam epitaxy (MBE) 152 f
monolayer 19, 76 f, 115, 121, 142, 150, 153, 155 f, 159, 207
Moseley's law 199, 201
multilayers 187 f, 216, 261, 264 f, 284 ff, 293 ff, 309 ff
– Co/Cu 187 f, 284 ff
– Ni₈₀Fe₂₀/Cu 284 f, 293 ff
– preparation 119 f
multistrip coupler 45

N

nanocontact 97
 nanotube 22, 24 f, 353, 365
 nanowire 97
 Néel coupling 76 ff
 Néel temperature 78 ff
 Ni/C 311, 318, 323
 nonequilibrium 150
 nonmagnetic 73, 75 f, 80, 82, 85, 92, 93,
 102, 195, 284, 295 f, 301, 305
 normal incidence reflection 107, 113
 nucleation layer 26 f, 260, 349 f

O

onchip interconnect 8, 10
 optical constants 106, 113, 116, 119 f
 orange peel coupling 75 f
 order selection 118

P

parabolicity 325 ff
 partially crystallized 48, 70
 particle energies 120 f
 patterning 261, 269 f
 – lift-off 261, 269 f
 peak broadening 184 f
 period thickness 110, 114, 117
 permalloy 284 f, 294, 298
 phase analysis 182 f
 phase contrast 163 ff
 phase shift keying (PSK) 361
 phase velocity 32, 34 f, 39, 43, 104, 106
 photocurrent 126 f
 photoemission microscope 377
 photoluminescence 48, 67 f
 photovoltaic 122 ff
 physical deposition 141, 159
 physical vapor deposition (PVD) 141,
 143 ff
 piezoelectric effect 261 ff, 266 ff, 282
 piezoelectric layer 45 f
 pinhole 290 f
 pinned layer 309
 pinning material 307
 plasma enhanced CVD 154
 plastic deformation 217, 223
 plasticity 241

pole figure measurement 185 f
 power durability 261, 263 ff, 269, 277
 power factor 65, 335
 power SAW test structure 268 f
 pulsed laser deposition 119 f, 314
 pyroelectricity 384

Q

quantum-well state 77

R

radio frequency 213, 365
 Rayleigh waves 32
 reciprocal lattice 170
 reduced radial density function 338 f
 reflectance 105 ff, 109 f, 112 f, 115 ff,
 119, 121
 reflection coefficient 36, 41, 42, 116 f
 reflective array compressor 361
 reflectometry 180, 190 ff
 reflector grating 29, 39, 44 f
 refractivity coefficient 105, 107 f
 relative absorber thickness 117, 119
 reliability 17 f, 22 ff, 234, 243, 245, 247 f,
 251, 260, 263 f, 324 f, 355, 362 f, 366
 resistance layers 324 ff
 – Cr-Si 325 f, 328 f
 – Cu-Cr 331 f
 – Cu-Ni 285, 295, 331
 – high-resistive 325 f
 – low-resistive 331 f
 resistivity 8 ff, 22 ff, 27 f, 42, 52, 56,
 62 ff, 69 f, 232, 237, 240, 242, 245, 247,
 249, 250 f, 253, 259, 260 f, 264, 266,
 269 f, 275, 277, 286, 293 ff, 299 ff, 305,
 323 ff, 331 ff, 349, 352, 364, 383 f
 resolution limit 161, 164 f
 resonator 353, 357 f
 – one-port 357 ff
 – two-port 358
 resonator filter 358 f
 – longitudinally coupled 358
 – transversally coupled 359
 resonator structure 272 ff
 responsivity 385
 roughness 258 f, 276, 286, 291, 305,
 310 f, 313 f

S

- satellite reflections 187
 - scanning electron microscopy (SEM)
 - 172 f
 - scattering 193, 194 ff
 - diffuse 193
 - magnetic 194 f
 - Schottky barriers 63
 - Schwarzschild objective 376 f
 - screen printing 160
 - SDD detector 204
 - Seebeck coefficient 52, 54, 62, 65 f
 - seed layer 12, 27, 251, 256, 259 f, 392
 - selected area electron diffraction 168 ff
 - self-diffusion 121, 264
 - semiconducting 14, 48 ff, 59 ff, 64 f,
 - 124 f
 - semiconductor 124 ff
 - sensor 362 ff, 383 ff, 388 ff, 394
 - angle 366 f, 370 ff, 380
 - flow 350, 365 f, 384, 388 ff, 392
 - infrared 364, 387
 - mass flow 362, 365 f
 - pressure 363 f
 - speed 349, 366 ff, 372, 389
 - thermoelectric 365, 383 ff, 388, 390 f
 - torque 364, 370
 - SFIT 42 f
 - silicide films 55 ff, 62 f, 70 f
 - silicides 48 ff, 59 ff
 - crystal structure 50
 - SIMS 207 f, 211 f
 - single-crystalline 57
 - single-phase unidirectional transducer 42
 - size-strain analysis 184
 - slowness surface 30, 39
 - soft X-rays 104 f
 - solar cells 123
 - solar telescope array 376 f
 - spacer layer 113
 - spectroscopy 197 ff, 209
 - specular reflectometry 191 ff
 - spin dependent tunneling 82 f, 102 f
 - spin dephasing length 82 f, 90
 - spin-down 73 f, 83 f, 87 f, 91
 - spinelectronics 89 f
 - spin FET 90
 - spin injection 89 ff, 102 f
 - spin-up 73 f, 83 f, 87 f, 91
 - spin valve 100 ff, 284, 301 ff, 307
 - spintronics 100 ff, 284
 - spread spectrum 360 f
 - Stoney equation 218, 221
 - strain 180, 184 f, 188 ff, 214 ff, 224 f
 - stress 13 ff, 34, 55, 57, 62, 142, 153, 157 f,
 - 160, 182, 190, 214 ff
 - growth 215 f, 357
 - mechanical 14 f, 22, 34, 55
 - relaxation 217, 221
 - thermal 216 f
 - stress-induced migration 18
 - structure evolution stress 215 f
 - structure zone model 121
 - substrate 142 ff, 152 ff, 157, 159, 162,
 - 177, 180, 185 f, 188, 190, 203, 213 ff, 225
 - substrate curvature 217 f, 221 f, 225
 - superconducting bolometer 384
 - superlattice structures 393 f
 - surface acoustic wave 28 ff, 30, 32, 36 f,
 - 343
 - metallization 234, 247, 261, 263 ff, 272,
 - 275 f, 282, 332
 - Rayleigh type 262
 - standing 262, 268 f, 274, 277 f, 315 f
 - stress field 262, 275
 - technology 270
 - traveling 262, 268 f, 274 f, 277
- surface oxidation 318
- surface skimming bulk waves 39
- surface transverse waves 39
- synthetic antiferromagnet 301
- T**
- tantalum 249 f, 261
 - telescope 374 ff
 - Cassegrain 376
 - space 361, 374 f, 394
 - Wolter 374 f, 396
 - X-ray 373 f, 375 ff, 380, 396
 - temperature coefficient of resistivity 324,
 - 332
 - texture 12 ff, 22, 237, 239, 241 ff, 245 f,
 - 251 f, 288 f, 317
 - texture analysis 185

thermal conductivity 8, 22, 25, 27 f, 52 f,
 61 f, 66, 332
 thermal converter 386
 thermal stability 251 ff, 266, 283 ff, 293,
 305, 309, 333
 thermal stress 215 ff
 thermionic emission 390, 393
 thermistor 384
 thermocouple 383 ff, 394
 thermoelectric energy conversion 383 f
 thermoelectric layers 335 ff
 – Fe-Si 335
 – Ir-Si 335, 337
 – Re-Si 338 f
 thermoelectric properties 333 ff
 – electrical conductivity 333
 – Seebeck coefficient 324, 333 f, 338
 – thermal conductivity 267, 324, 333
 thermoelectricity 333 f
 thermomechanical stability 254
 thermomigration 18
 time-to-failure 235, 279
 total external reflection 105
 transmission electron microscopy (TEM)
 160 ff, 249, 251, 256, 273, 288 f, 291, 335
 – energy filtered (EFTEM) 166, 197
 – high resolution (HRTEM) 164 f
 – specimen preparation 161 f, 165
 transport properties 48, 51, 69, 70
 transversal filter 354
 tungsten 9, 11, 12, 27
 tunnel barrier 307
 tunneling magnetoresistance 83 f, 93 f,
 284, 305
 two-current model 88

U

unidirectional 42 f, 78, 80, 82, 96, 274,
 308, 356, 362

V

vapor 9 f, 27, 55 f, 59, 119, 141 f, 148,
 150, 153, 176, 321, 349, 387, 391 f
 void 234 ff, 238, 243 ff, 245, 261, 272,
 276 f

W

waveguide 44 f
 Wheatstone bridge 363, 369
 withdrawal weighting 355 f

X

X-ray 103 f, 245, 252, 288 f, 310, 312,
 319, 321 ff, 329 f, 333, 335, 339, 345 f
 – diffraction 185, 214, 224, 288 f, 335,
 339
 – microdiffraction 245
 – mirror 114 ff
 – reflectometry 312
 – spectroscopy 198, 200, 202
 – soft 103 f, 194 ff
 – fluorescence analysis 381
 – optical systems 373

Z

Z path filter 357
 zone axis 170 f