

# Subject Index

- Adsorption 29
  - , infrared 29–30, 184, 252–253
  - , optical 148–150, 183, 188–189, 196, 205–208
- Amorphous junction 94–106
  - – configurations 95–97
  - – devices 94–106
  - –, *p-i-n* 200
  - –, *p-n* 91
  - –, stacked 219–220
- Amorphous silicon FET 83–90
  - – –, basic design of 83
  - – –, limitations of 90
  - – –, logic circuits and 87
  - – –, long term stability of 87
  - – –, radiation hardness of 85
  - – –, reproducibility of 87
  - – –, uniformity of 87
- Argon 36, 38
- Bi-stable multivibrators 89
- Built-in potential 212, 238–239
- Carbon 41, 183, 199
- Chemical vapor deposition 177ff.
  - – –, homogeneous 177–180, 184–185, 189
  - – –, low pressure 177–179, 182
- Chlorine 39
- Columnar growth morphology 21, 25, 41
- Compensation 36, 94
- Continuous random network 12
- Conversion efficiency 203–204, 257–261
- Crystallization 12, 177, 182–183
  - , thermal 113
- Dangling bonds 177–178, 185, 187
- Dark conductivity 162–165
- Deep-level transient spectroscopy 81–82, 275
- Defect 80, 148–153
  - formation under illumination 80
- Density of states 78
- Deuterium 42, 51
- Device measurements 167–169
- Diborane 91, 191–192
- Diffraction 10
  - , electron 11
  - , neutron 11, 21, 42
  - techniques 10–14
  - , x-ray 11, 21, 182
- Diffusion length 98–99, 209
  - coefficient 186–187
- Disclinations 24
- Doped films 210–212
- Doping 33, 169–170, 183, 191–198
  - , arsenic 36
  - , boron 36, 51, 93–94, 191–192, 196–198, 273
  - by ion implantation 93–94
  - characteristics 250–251
  - , gas phase 91
  - , interstitial 93
  - in the amorphous phase 90–94
  - , phosphorus 36, 93–94, 191–192, 196, 199, 273–274
  - , substitutional 79, 90
- Drift length 98
- Electrical transport 161–169
- Electrophotography 103
- Ellipsometry 54
- Extended x-ray absorption fine structure 7, 10, 13
- Field effect 72, 193, 196
  - –, analysis of 76
  - –, principle and experimental details 72
  - – technique 72
  - – transistor 83–90
- Fluorinated amorphous silicon 245ff.
  - – –, dark conductivity of 247–248
  - – –, doping characteristics 250–251
  - – –, gap state density 248–249
  - – –, glow discharge fabrication of 247
  - – –, infrared spectra 252–253
  - – –, MIS devices using 261–270
  - – –, photoconductivity 251–252

- Fluorinated amorphous silicon  
 - - -, photovoltaic devices using 256-261, 273-280  
 - - -, sputtering fabrication of 253-254  
 - - -, the role of fluorine in 254-256  
 Fluorine 41, 51
- Gap state density 78, 154, 248-249  
 - - -, capacitance measurements of 155-160  
 - - -, DLTS measurements of 160-161  
 - - -, ESR measurements of 161  
 - - -, field effect measurements of 78, 160  
 Gaseous impurities 71  
 Glow discharge silicon 63 ff.  
 - - -, implantation damage in 94  
 - - -, large scale deposition of 67  
 - - plasma 71  
 - - -, rf deposition of 64-67, 70  
 - - -, substrate temperature 65-66  
 - - -, use of SiF<sub>4</sub> in 109
- Hall effect 109-112  
 - - of good  $\mu$  c-Si 110  
 - mobility 111  
 Heterojunction cells 219  
 High current diodes 95, 97  
 Hydrocarbons 39  
 Hydrogen  
 - content 30, 142  
 - effusion 32, 35  
 - evolution 28, 29, 32, 41, 72,  
 -, ortho- 50  
 -, para- 50
- Image sensor 87, 89  
 - tubes 103  
 Implantation damage 94  
 Integrated inverter circuit 87-88  
 Interface 54  
 - barrier 95  
 -, metal/a-Si:H 54, 95, 258  
 Ion implantation 29, 90, 93-94, 187  
 - - damage 94
- Lifetime of excess carriers 96  
 - - photogenerated carriers 208-209  
 Liquid crystal matrix displays 83, 86-87  
 Localized states 72, 78, 154, 248-249  
 - -, density and distribution of 72  
 Luminescence 150, 189  
 -, steady state 150-154  
 -, transient 150-154
- Memory device 104-106  
 - -, initial forming step 105
- Metal amorphous-silicon barrier 95, 216-218  
 - - -, differential capacitance of 95  
 Metal work function 267  
 Metalization 54  
 Microcrystalline amorphous silicon 16-17  
 - - -, conductivity of good 109  
 - - - prepared in glow discharge 93, 106-114  
 - - - structure 107-108  
 - - -, two phase model for 108, 111  
 Microscopy 19  
 MIS cells 216-218, 261-270, 274  
 -, transmission electron 20-26, 41, 140  
 -, scanning electron 139-142  
 Mobility 98, 165-166, 208-209, 256  
 Monolithic series-connected panels 220
- NAND gates 89  
 Neon 40  
 Nitrogen 39  
 NOR gates 89  
 Nuclear reaction analysis 27, 33  
 Nucleation 17, 26  
 -, homogeneous 178, 180
- Oxidation 53  
 Oxygen 39
- Phosphine 91, 191-192  
 Photoconductivity 166-167, 191, 193, 196, 199, 251-252  
 Photolithography 83  
 Photovoltaic device 98, 256-261  
 - -, effect of doping on 277-278  
 - - performance 271-273  
 - - reproducibility 271-273  
 - -, stability of 279-280  
*p-i-n* junction 200, 218-219, 273-280  
 Plasma 70, 127  
 - containing dopant gases 71  
 - interaction with substrate 132-134  
*p-n* junction 91, 273-280  
 Polysilane 41  
 Post hydrogenation 186-190
- Radial distribution function 11  
 Raman scattering 16-17, 182-183  
 - -, interference enhanced 54  
 Recombination 101  
 -, geminate 101-102, 257  
 -, nongeminate 102
- Schottky barrier 56, 216-218, 257, 274  
 - diode 199

- SCL current flow 96
- Shift register 89
- Sign of majority carriers 73
- Silane 68, 177
  - , di- 68
  - diradical 69, 180
  - , higher 177, 181, 184
  - plasma 70
  - , tri- 68
- Silicides 54
- Solar cell 212ff.
  - - by dc glow discharge 213-214
  - - by rf glow discharge 214-215
  - - current voltage characteristics 221-225
  - -, deposition conditions for 212-216
  - -, effect of impurities on 227-229
  - -, spectral response of 225-227
  - - stability 229-232
  - -, substrate preparation for fabrication of 213
  - -, theoretical modeling of 232-236
- Space charge 82
  - - limited current flow 82
  - - region 256-258
- Spectroscopy
  - , deep-level transient 81, 275
  - , glow discharge optical 36
  - , mass 70
  - , optical emission 70
  - , photo-thermal deflection 53, 149
  - , secondary ion mass 28, 37, 143, 184, 186, 192
- Spin diffusion 45
- Spin lattice relaxation time 43, 49-52
- Spin resonance 14
  - -, electron 185, 192-193
  - -, nuclear magnetic 14-16, 139-140, 144, 147-148
  - -, optically detected 151, 154
  - -, proton magnetic 29, 43-49
- Sputtered material 119ff.
  - - deposition 215-216
  - -, structure and morphology of 137-148
  - - with fluorine 253-254
- Sputtering 121-136
  - , bias 134
  - , deposition parameters and conditions in 136
  - , magnetron 135-136
  - mechanisms and plasma 121-127
- Stacked junctions 219-220
- Staebler-Wronski effect 230
- States 73
  - , interface 73
  - , surface 73
  - , tail 112
- Surface 52
  - analysis 52
  - states 73
- Thermoelectric power 112
- Thin film transistor 72
- Voids 19
- Zener breakdown 97