Subject Index

A
Activation energy, 150
Aluminum, 202, 243, 387
Anisotropic profile, 202
Annealing, pre- and post-epitaxial, 371
Antimony, 54, 371
Argon, 339
Arsenic, 115
ASTM Standards
F 110: 126
Atomic absorption
spectrophotometry, 314
Autodoping, 30
Automated inspection, 87
Automation, 450

B
Barrier resistance model, 74
Berkowitz-Lux technique, 74
Bevel sample preparation, 96
Boron, 54, 174, 361
Buried layer, 115, 361

C
Calibration data, 74
Calibration methodologies, 350
Capacitance-voltage method, 387
Carrier traps, minority, 324
Chemical analysis, 314
Chemical staining, 126
Chemical thermometer, 150
Chemical vapor deposition, 150, 400
Chlorine, 202
Cleanliness
equipment, 222
testing, 222
Contaminants and contamination
(See also Impurities)
electrically active, 387
in native oxide, 314
microparticulates, 215
nondestructive assessment
of, 305
Control charts, 415

D
Deactivation, boron, 174
Defects
clustered, 415
density, 30, 371
electrical, 174
epitaxial, 115
gross, 266
inspection, 87
microdefects, 54
oxygen-induced, 54
random, 266
depletion layer width, 387
deposition
aluminum, 243
chemical vapor, 150, 400
polysilicon, 150, 400
dislocations, misfit, 361
dopants and doping
antimony, 54, 371
autodoping, 30
boron, 54, 361
co-doping, 361
germanium, 361
profiles, 96, 387
segregation coefficient, 7
uniformity, 30
double level metallization, 252

E
Edge crown, 30
Efficient Multilayer Analysis
Program, 74
Electrical effects, 174
Encapsulation, epitaxial, 387
Energy dispersive X-ray
spectroscopy, 339
Etching
aluminum, 202
chemical, 361
dry, 159, 174, 182
ion beam, 174
plasma, 174
reactive ion, 174
silicon dioxide chemical, 182
sputter, 243
wet, 243

F
Factorial experiment, 427
Filter cleanliness, 222
Fourier transform infrared
spectroscopy (FTIR), 350
Fracture markings, use of, 18

473
G

Gallium/aluminum diffusion, 324
Gallium arsenide, 43, 96, 159
Gauge capability, 427
Gettering, 54, 324, 339, 371, 400
Gold diffusion, 324

H

Hydrogen/deuterium, 174
Hydrogen fluoride, anhydrous, 182

I

Implants
argon, 339
arsenic, 115
boron, 174
epitaxial, 115
ion, 174, 339
oxygen, 339
Impurities (See also
Contaminants and contamination)
metallic, 305, 314
Inspections
automated, 87
in-process, 266
microscopic, 87
Integrated circuit fabrication
industry, 415, 442
Interconnection,
multilevel, 252
Isolation
oxide, 284
technologies, 284
trench, 284

J

Junction depth, 126

L

Large scale integration (LSI)
(See also very LSI), 252
Laser scanning
inspection system, 87
instruments, 215
Light extinction, 230
Linewidth, 450
Load line calibration, 350

M

Magnetic field, rotating,
effect on oxygen content, 7
Materials (See also
specific types)
specifications, 442
characterization, 74
Melt convection, 7
Metal grain notching, 243
Metallization, double level
process, 252
Metal semiconductor field
effect transistor, 159
Metrology, 450
Microdefects, 54
Microdiffraction, 339
Microscopic inspection, 87
Microspheres, 215
Micro-wires, 361
Misfit dislocations, 361
Monolithic microwave
integrated circuit, 159

N

National Bureau of Standards,
215, 450
Neyman distribution, 415
Nitrogen mixing, 202
Notching, metal grain, 243

O

Open circuit voltage decay
(OCVD), 324
Optical overlay measurement
system, 427
Optical particle counters, 230
Overlay evaluation, 427
Oxygen content, 7, 350
Oxygen implants, 339
Oxygen precipitation (See Precipitation, oxygen)

P

Particle
counting, 222, 230
optical, counters, 230
properties, 230
Particulates, 215
cleanliness, 222
Perkin-Elmer scanner, 427
Phosphorus, 387
Planarization, 252
Plasma oxide, 252
Plasma processing, 159
Poisson distribution, 415
Polysilicon
  deposition process, 54
  growth, 150
  layer, 400
  structure, 400
Precipitates, metallic, 115
Precipitation, oxygen, 43, 54,
  339, 371, 400
Probe radius model, 74
Profiling
  anisotropic, 202
  high resolution electrical, 74
  resistivity, 96
  spreading resistance, 74, 96
Q
Quality control, 415
R
Rate limitations, 182
Reaction mechanisms, 182
Reactor, single wafer, 30, 202
Recombination, Shockley-
  Read-Hall, 324
Reflectivity, aluminum, 243
Residual gases, 243
S
Samples
  bevel, preparation, 96
  cleanliness, 222
  surface preparation, 126
Scanning
  inspection system, 87
  laser, 215
Scattering, 230
Schottky diode, 387
Secondary ion mass
  spectrometry (SIMS),
    126, 339, 350
Segregation coefficient, 7
Selective epitaxy growth
  (SEG), 284
Semiconductors
  industry productivity, 450
  liquids, 230
  materials (See specific types)
  Separation by Implanted
    Oxygen (SIMOX), 284
Sheath voltage, 202
Silicon
  crystal growth, 7
  determinations, 350
  dioxide, 182
  epitaxy, 30, 54, 87, 361, 371
  fracture analysis and
    markings, 18
  iron in, 339
  measurements, 350
  on insulator (SOI), 284
  on sapphire (SOS), 284
  polysilicon, 150, 400
  resistivity, 450
  slice fracture, 18
Solid solution hardening, 43
Specifications (See standards)
Spectral analysis, 202
Spin-On-Glass method, 252
Spreading resistance
  adaptation for GaAs, 96
  compared to staining, 126
  computer simulation of, 126
  models for, 74
  profiling, 74, 96
Sputtering, 243
Staining method, 126
Standards, 215, 442
  economic value of, 450
ASTM F110: 126
Static RAM (random access
  memory), 266
Statistics
  process control, 442
  techniques, 427
Strain compensation, 361
Surface
  analysis, 314
  impurity, 305, 314
  inspection, automated, 87
  photovoltage, 324
  quality, 87
T
Test structures, 450
Thermal process, 43, 150
Total reflection X-ray
  fluorescence analysis
    (TXRF), 305
Transition metals, 305
Transition width, 30
Transmission electron
  microscopy, 339
Tungsten, 150
<table>
<thead>
<tr>
<th>V</th>
<th>Very large scale integration (VLSI), 252, 266, 284, 314, 387</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>Wafers contamination, 215, 305, 314 chemical analysis of, 314 cracking, 18 fracture analysis and markings, 18 hardness, 43 measurements, 427 metal contamination of, 305 nucleation and growth kinetics, 54</td>
</tr>
<tr>
<td></td>
<td>reactor for single, 30, 202 strength temperature dependence, 43 surface analysis, 314 impurity, 305, 314 inspection, automated, 87 photovoltage, 324 quality, 87 temperature map, 150 temperature uniformity, 150 thermal processing of, 43, 150 Wire bonding, 450</td>
</tr>
<tr>
<td>X-Z</td>
<td>X-ray fluorescence analysis, 305 Yield enhancement, 266, 442 Zone melting recrystallization (ZMR), 284</td>
</tr>
</tbody>
</table>