

Index

A

Absorbance 419
Absorber 230
Absorption 184
 coefficient 202
 edge 228, 231
 index 140
 spectroscopy 135
Accelerating voltage 146
Accidental channeling 689
Accuracy of Electron Probe
 Microanalysis 185
ADAM 244
Adsorbates 18, 225, 247, 442
Adsorption 736
 geometry 451
 isotherm 738
 site 451
AED 240
AEM 121, 136, 161
AES 310, 604
AES analysis 321
Air pollution 357
Alloy compositions 385
Amorphous materials 198, 211
Analytical
 electron microscopy 121, 136, 161
 signals 137
 spectroscopies 144
 total 186, 187
Analyzing crystals 340
Angle-integrated spectra 303
Angular Distribution Auger
 Microscopy 244
Anharmonic vibrations 235
Annular Dark-Field Imaging 167
Antiferromagnetism 249
Antiphase domains 255

Aqueous solution 627
Archaeology 357
Art 357
Artifacts in CL 158
Atmospheric science 357
Atomic arrangements 198
Atomic Force Microscope 703
Atomic level excitation 137
Atomic Number Effect 183
Atomic plane 200
Atomic steps 272
Attenuated Total Reflection 423
Auger 144
 electron diffraction 240
 electron emission 231, 313
 electron spectroscopy 310, 604
 electron yield 231
 electrons 311, 331
 spectrometer 321
 spectrum 319
Average
 particle-size estimations 648
 roughness 698

B

Backscattered electrons 72, 187, 331
Backscattering 230
Band shape analysis 421
Band structure 374
Beam charging 366
Beam heating 366
Beam pulsing 365
Beam-induced conductivity 82
Beer-Lambert Law 420
Bidirectional scattering
 distribution function 716
Binding energy 138

Biology 357
Birefringence 61
Blocking 502
Blocking dips 507
Bond lengths 18, 227
Bragg's Law 201, 339, 649
Bragg-Brentano geometry 203
Bravais nets(2D) 253
Bremsstrahlung 177, 358, 360, 367
Bright-Field Imaging .09, 167
Broadening parameter 386
BSDF 716
Bulk analysis 358, 363
Bulk conductors 601
Bulk plasmons 327
Buried interfaces 230

C

Carbon monoxide 740
Carrier types 386
Catalysts 224
Cathodoluminescence 82, 149
 analysis systems 153
 depth-resolved analysis of
 subsurface metal-semicon-
 ductor interfaces 157
 emission 151
 microscopy and spectroscopy
 149, 150, 155
CBED 161
CdMnSe 393
CdMnTe 393
CdZnTe 393
CEELS 326
CER 390
Channeling 365, 480, 502, 689
Characteristic X rays 28, 176, 357, 359

- Characterization of optical properties of wide band-gap materials 157
 Charge-coupled device 432
 Chemical bonding 136, 141, 358
 composition 385
 mapping 556
 shift interactions 463
 shifts 235
 state determinations 143, 287, 295, 325, 342
 Chemometric techniques 422
 Cluster growth 261
 CMA 315
 Collective excitations 140
 Compositional images 162, 169, 187
 Computers 126
 Confocal microscopy 702
 Constructive interference 255
 Contactless electroreflectance 390
 Contamination 362
 Continuum 177
 Convergent beam electron diffraction 161
 Coordination numbers 18, 144, 218, 227, 460
 Core-level transitions REELS 326
 Core levels 228
 Corrosion and oxidation 357, 362
 Coulombic interaction 136
 Critical excitation energy 176
 Cross sections 144, 359, 494
 Cryosorption pumping 601
 Crystal growth at elevated temperatures 398
 Crystal structure (2D) 252
 Crystalline phases 198, 460
 CTEM 121
 Curve fitting 233
 Cylindrical mirror analyzer 315
 Czerny-Turner 432
- D**
- Damaged layer 481
 DCD 205
 de Broglie 265
 Dead time 182
 Debye-Waller factor 220, 234, 261
 Deconvolution algorithms 185
 Defects 271, 437
 Density of states 143
- Deposited layers 362
 Depth profiling 364, 503, 537, 564, 698
 resolution 498, 688, 700
 resolved studies of defects in ion-implanted samples and of interface states in heterojunctions 150
 Detection limits in the ppm to sub-ppb range 532
 Detectors 417
 Determination of composition and thickness 343
 Deuterium tracer 500
 Device parameters 382
 Diamond 157
 anvil cells 423
 Diamond-like carbon 496
 Diblock copolymers 668
 Dielectrics 140, 409
 Differential Reflectivity 391
 Diffraction 54, 180, 252
 contrast 110
 pattern 264
 Diffusion 199, 209, 261
 Digital compositional maps 190
 Direct multielemental analysis of conducting solids 622
 Direct-gap materials 152
 Dislocation contrast 155
 densities 156
 Disorder 234
 Dispersed samples 230
 Domain boundary motion 261
 Dopants at trace levels 533
 Dot mapping 131, 187
 Double-crystal diffractometer 205
 Duoplasmatron 568
 Dynamic SIMS 40, 41
 Dynamical scattering 276
 Dynamical X-Ray Diffraction 203
- E**
- EBER 390
 EDS 103, 120, 144, 161
 FWHM 127
 EELFS 231
 EELS 103, 135, 161
 Elastic peak 327
 recoil detection 488
 Recoil Spectrometry 37, 488
 scattering 137
 Electric 385
- Electric quadrupole interactions 463
 Electrically active defects 155
 Electrochemical systems 224, 231
 Electrodes 599
 Electromodulation 388
 Electron 147
 Electron beam 310
 Electron binding energy 215
 Electron Energy-Loss Spectroscopy 103, 135, 161, 231
 Electron-gas SNMS 575
 Electron impact ionization 573
 Electron irradiation (displacement) damage 146
 Electron probe microanalyzer 121
 Electron probe X-ray microanalysis 175
 Electron range 130
 Electron-stimulated desorption 568
 Electron Transport 314
 Electron yield 216
 Electron-beam electroreflectance 390
 Electronic structure 136, 141
 Electrostatic spectrometers 447
 Elemental analysis of materials 136, 338
 coverage 606
 Depth Profiling 341
 impurity survey 617
 line scans 131
 surveys 45, 607
 Ellipticity 726
 Emission 423
 Emission spectroscopy 598, 606
 Empirical parameters method 342
 Empty states 135
 Emulsion response curve 605
 Energy levels 231
 Energy resolution 127
 Energy straggling 683
 Energy-dispersive spectrometry 103, 120, 161, 179, 358
 Energy-loss function 140
 Environmental 366
 Environmental SEM 83
 Epitaxy 198, 246
 EPMA 121, 175
 ERD 488
 Error distribution histograms 185

- ERS 37, 488
 ES 598, 606
 Ewald sphere 257, 272
 EXAFS 214, 224
 Excitation Spectroscopy 379
 Exciton 375
 EXELFS 143
 Extended Energy-Loss Fine Structure 143
 Extended X-Ray Absorption Fine Structure 214
 External-beam PIXE 365
 Extinction angle 61
 Extrinsic luminescence 152
- F**
- $f(rz)$ 131, 185
 Failure analysis 586
 Fermi level 140
 Fermi level pinning 328, 398
 Ferromagnetic 249
 Fiber texture 202
 Field-emission electron gun 164
 Fields 385
 Film crystallinity 439
 density 484
 growth 273
 on substrates 187
 Fingerprinting 435
 FK oscillations 392
 Fluid Inclusions 439
 Fluorescence 231, 375, 373, 434
 Fluorescence effect 184
 yield 231, 313
 X rays 18
 Forensic science 357
 Forward recoil spectrometry 488
 Fourier transforms 220, 232, 233
 Fourier transform Raman spectroscopy 432
 Fragmentation 550
 Franz-Keldysh oscillations 392
 Free electron model 140
 Free induction decay 462
 Fresnel reflection coefficients 404
 FRS 488
 Functional groups 443
 Fundamental parameters method 343
- G**
- GaAlAs 393
 GaAlInAs 393
 GaAlInPAs 393
 GaAlP 393
 GaAlSb 393
- GaAs 376, 397
 GaInSb 393
 Gaussian and the peak 121
 GDMS 598, 606, 609
 full elemental coverage 612
 Gels 438
 Generation (or excitation)
 volume 151
 Geological 366
 Geometric effects 187
 Geometric structure 227
 Geoscience 357
 GeSi 393
 GIXD 205
 Glasses 438
 Glow-Discharge Mass Spectrometry 46, 598, 606, 609
 Glow-discharge plasma 610
 GPMBE 386
 Grain size 82, 198, 261
 Grating spectrometer 639
 γ -ray spectroscopy 673
 Grazing geometry 27
 Grazing incidence X-ray diffraction 205
 Growth modes 240, 246
 Gyromagnetic ratio 461
- H**
- Harmonic vibrations 235
 Heavy Ion Scattering 497
 Heavy metals 27
 He-H scattering 489
 Helium 139, 358
 Heterojunction bipolar transistors 386
 Heterostructures 409
 HFS 488
 HgCdTe 393
 HgMnTe 393
 high-pressure chamber 231
 high-resolution
 depth profile 578
 electron energy loss spectroscopy 442
 electron microscopy 109
 transmission electron microscopy 112
 Holography 248
 HPGe 125
 HREELS 442
 Hydrides 139, 140
 Hydrogen 139, 142, 144, 740
 analysis 488
 depth profiles 680
 forward scattering 488
- profiling 37
- I**
- ICPMS 47, 606
 ICP-OES 633
 ICP-optical 606
 Image analysis 81
 Impurities 361
 InAsP 393
 InAsSb 393
 Inclusions 187
 Index of refraction 405
 Indirect-gap materials 152
 Inductively coupled plasma mass spectrometry 47
 Inductively Coupled Plasma Optical Emission Spectroscopy 633
 Inelastic mean free path 315
 Inelastic scattering 136, 137
 Infrared 417, 421
 Infrared spectroscopy 416, 417
 InGaAs 393
 InGaAsP 393
 Inner shell levels 141
 InP 397
In-situ studies 386, 651, 654
 Instrumentation 339
 Insulating samples 79
 Integrated peak intensity 422
 Interaction volume 177
 Interatomic distances 218
 Interband transitions 326
 Interelement 183
 Interface Optical Effects 425
 Interface structures 240
 Internuclear bond distances 460
 Interphase plasmon 330
 Intramolecular Bond Length 237
 Intrinsic luminescence 152
 Ions 502
 beams 535
 implantation 386
 source 568
 yield 216
 Ionization cross section 129
 Ionization energy 151
 Ion-sensitive emulsion detector 600, 605
 Ion-sensitive plate 600, 601
 Isotope ratios 533
 Isotopic tracer experiments 680
- J**
- Joint density of states 143

- K**
- K edges 231
 - K factor 132
 - K shell 139, 312
 - Kanaya-Okayama electron range 177
 - Kerr component 726
 - Kerr microscopy 730
 - Kinematic Diffraction 267
 - Kinematic factor 477
 - KLL Auger transition 312
 - Kossel pattern 82
 - Kramers-Kronig analysis 140
- L**
- L shells 139
 - L edges 231
 - LAMA-III program 346
 - LAMMA 44
 - LAMMPS 44
 - Langmuir-Blodgett films 666
 - Laser 561
 - ablation 629, 639
 - Ionization Mass Spectrometry 44
 - or rapid annealing 386
 - Lateral resolution 324, 688, 724
 - Lattice rods 272
 - Layered film materials 187
 - LEED 20, 265
 - Light element detection 137, 182
 - Light microscope 7
 - Light Polarization 403
 - LIMA 44
 - Limiting count rate 182
 - Limits of detection 182
 - LIMS 44
 - Line widths 231, 385
 - Linear diode array 432
 - Liquid-metal ion guns 566
 - Local
 - coordination 18
 - order 227
 - potential 81
 - symmetry 460
 - Longitudinal geometry 727
 - Lorentz microscopy 106
 - Loss tail analysis 319
 - Low-Energy Electron Diffraction 20, 265
 - Low-energy ion sputtering 364, 575
 - Low-pressure RF plasma 575
 - LVV transition 313
- M**
- M shells 139, 313
 - Magic-angle spinning 468
 - Magnetic
 - dipole moment 35
 - dipole-dipole interactions 463
 - materials 651
 - sector spectrometer 139
 - Thin Films 657
 - sector spectrometers 552
 - Mapping 380, 565
 - Mass contrast 110
 - Mass resolution 604
 - Mass scan 537
 - Mass spectrometer 40
 - Material microstructures 402
 - Matrix Corrections 183
 - Matrix effects 183, 561, 565
 - Mattauch-Herzog 600
 - MBE 265, 386
 - Mean free path for inelastic scattering 146
 - Mechanical profilers 699
 - Medicine 357
 - Medium-energy ion scattering 502
 - Memory effects 601
 - Metal area 740
 - Metal dispersion 740
 - Metal hydrides 328
 - Metalloenzymes 224
 - Metallurgy 357
 - Methods for Surface and Thin-Film Characterization 321
 - Metrology 81
 - Microbeams 365, 680
 - Microdensitometer 605
 - Microdiffraction 107
 - Microscopy 424
 - Miller indices 200, 253
 - Minimum detection limit 120
 - MOCVD 386
 - Model compounds 230, 235
 - Modulation spectroscopy 30, 385
 - MOKE 724
 - Molecular 236
 - adsorbates 18, 236
 - area 739
 - beam epitaxy 265
 - orbital 236
 - orientation 228
 - Monolayers 738
 - Monolayer volume 739
 - Monte Carlo simulations 177, 507
- Moseley law** 339
- MPI** 562
- Multichannel analyzer** 123, 179
- Multielement analysis** 27
- Multielement standards** 186
- Multi-element surveys** 606
- Multilayers** 198, 211
- Multiphoton** 562
- Multiphoton ionization** 560, 562
- Multiple reflection effects** 425
- Multiple scattering** 146, 234, 262
- Multiply charged species** 605
- N**
- N shells 139
 - NAA 671
 - Nearest neighbors 18, 136, 144, 227, 233,
 - Near-surface temperatures 386
 - Neutron Activation Analysis 671
 - Neutron flux 672
 - Neutron reflectivity 50
 - Neutron sources 648, 653
 - NEXAFS 235
 - Nitrogen 56
 - NMR 35
 - Nonconductors 129, 311, 602, 689
 - Nonresonant multiphoton ionization 587
 - Nonresonant profiling 684
 - Nonselective photoionization 562
 - Normalization 187
 - NRA 680
 - Nuclear reaction analysis 680
 - Nuclear reactors 651
 - Numerical aperture 63
- O**
- O shells 139
 - Optical
 - CL microscopes 154
 - coatings 409
 - constants 140, 401
 - factor 713
 - microscope 182
 - Profiler 700
 - scatterometry 54, 704
 - spectroscopy 633
 - Ordering of magnetically active atoms 648
 - Organic polymers 587
 - Overlayer unit mesh 259
 - Overlayers 246

- Overvoltage 177
 Oxidation state 18, 235
 Oxides 362
 Oxygen 740
- P**
- Partial electron yield 231
 - Particle 187
 - accelerators 484
 - size 740
 - spectrometry 490
 - Particle-Induced X-Ray Emission 28, 357
 - Particles 187
 - Passive films 224
 - Pattern recognition techniques 587
 - Peak position and width 421, 422
 - Peak-to-background ratio 182
 - Peltier cooling 126
 - Penning ionization 610
 - Phase
 - composition 198
 - contrast 112
 - formation 199
 - identification 169, 206, 648
 - shift 232, 229
 - transitions 261, 435
 - Phonon modes 443
 - Phonon-scattered incident electrons 138
 - Phosphorescence 375
 - Photoelectric absorption 184
 - Photoelectron wave 228
 - Photoionization 562
 - Photoluminescence 373
 - Photon energy 228
 - Photoreflectance 389
 - Physical adsorption 737
 - Piezomodulation 388
 - Piezoreflectance 390
 - Pile-up 124
 - PIXE 28, 357, 358, 365
 - and low-energy ion sputtering 365
 - and RBS 364
 - Plasmon 138, 140, 326
 - Pleochroism 61
 - Point group and space group determination 168
 - Point-to-plane 607
 - Point-to-plane surface technique 604
 - Polarization measurement 407
 - Polarization vector 229, 236
 - Polarized light microscope 61
 - Polarized neutrons 50
 - Polyatomic 604
 - Polyethylene slug die 602
 - Polymer 379, 380
 - Polymer surfaces 454
 - Porto notation 433
 - Post-ablation ionization 588
 - Post-ionization 559, 573
 - Powders 602
 - PR 389
 - Preferred orientation 198, 208
 - Primary and secondary excitations 343
 - Probing depth 324, 724
 - Process- or growth-induced strains 386
 - Profilmeters 699
 - Protons 358
- Q**
- Q values 681
 - Quadrupole spectrometers 551
 - Qualitative analysis 183, 338
 - Quantification 155, 366
 - Quantitative analysis 120, 183, 342
 - compositional mapping 188
 - compositional measurements 141, 338
 - concentration measurements 144, 145
 - depth-profiling 476
 - quantum wells 156, 374, 379
- R**
- Radiation damage 498
 - Radiofrequency 35
 - Raman scattering 429
 - Raman spectroscopy 429
 - Range of electron penetration 151
 - RBS 311, 476
 - Reaction cross sections 681
 - Reactive-ion etching 386
 - Reciprocal lattice 257, 267
 - Recoil cross section (1H) 494
 - Reconstructions 503
 - REELM 328
 - REELS 25, 324
 - Reflectance 419
 - Reflected electron energy-loss microscopy 25, 324, 328
 - Reflection 423
 - absorption (RA) spectroscopy 423
 - Difference Spectroscopy 391
 - high-energy electron diffraction 253
 - Reflectivity 140, 663
 - Refractive index 61, 140, 661
 - Region of interest (ROI) 131
 - Reliability comparison 507
 - Residual stress measurements 648
 - Resonance (π) 236
 - Resonant profiling 683
 - RF spark 605
 - R factor 507
 - RHEED 253, 264
 - Root-mean-square roughness 698
 - Rotation 726
 - Rough surfaces 187
 - Roughness 54, 698
 - RUMP 497
 - Rutherford backscattering spectrometry 36, 476
 - Rutherford backscattering spectroscopy 311
 - Rutherford scattering 502
- S**
- s resonance 236, 237
 - SAD 107
 - SALI 42, 559
 - imaging 566
 - Sample Rotation 707
 - Scanning Electron Microscope 8, 70 121, 701
 - Scanning force microscope 703
 - Scanning transmission electron microscope 161
 - Scanning Tunneling Microscope 703
 - Scattering cross section 478, 481
 - Schottky barrier formation 386
 - Schottky barrier heights 328
 - Scintillation counters 341
 - Searchlight effect 229
 - Secondary electron 72, 315
 - Secondary fluorescence 184
 - Secondary ion mass spectrometry 40
 - Secondary ion mass spectroscopy 311
 - Secondary ion yield 706
 - SEELFS 328
 - Seemann–Bohlin geometry 204
 - Selected-area diffraction 107
 - Selective chemisorption 743
 - SEM 121, 701
 - Semiconductor 350, 357, 409, 601

- Sensitivity 688
 SEXAFS/NEXAFS 18
 short-range order 223
 short-range single scattering 221
 Si 271, 378
 Si (Li) detectors 123, 126
 Sign of elongation 61
 SIMS 40, 41, 311, 604
 Simulation Programs for NRA 690
 Single scattering 232, 234
 Single crystal surfaces 442
 Single-Layer Films 343
 Single-pass transmission 422
 Single-photon ionization 560, 562
 SMOKE 724
 Snell's Law 404
 SNMS 43
 comprehensive elemental coverage 578
 concentration depth profiles 572
 Solid state effects 143
 Solid state nuclear magnetic resonance 35
 Spallation 652
 Spallation sources 665
 Spark Source Mass Spectrometry 598
 Spark source mass spectrometry 45
 Spatial resolution 153, 179
 Spatial uniformity of stresses in mismatched heterostructures 156
 Spectral acquisition 180
 Spectral resolution 180
 Spectroelectrochemistry 224
 Spectrum Simulation 497
 SPI 562
 Spin-lattice relaxation time 463
 Spin-orbit splitting 289
 Spin-Polarized Photoelectron Diffraction 248
 Sputtered neutral mass spectrometry 43
 Sputtering 40, 43, 147, 363, 386
 SREM 264
 SSMS 45, 598, 606
 Standardless methods 186
 Standards 145
 Standards or reference materials 547
 Static 234
 Static Secondary Ion Mass Spectrometry 41
 STEM 121, 135, 139, 161
 Step density 260
 Stereo imaging 702
 STM 703
 Stokes scattering 430
 Stopping cross section 480, 481
 Straggling 499
 Strain 198, 207, 385
 Stress distributions in epitaxial layers 150
 Structural information 240
 Structural parameters 503
 Substitutional 481
 Substrate Temperature 397
 Sum peak 124
 Superconducting Oxides 655
 Superlattices 374
 Surface 240
 Analysis by Laser Ionization 42, 559
 and interfacial roughness 401
 Areas by the BET Method 736
 atomic structure 260
 charging 367
 chemical information 41
 crystal structure 265
 crystallography 20
 damage 374
 disorder 20
 electron energy-loss fine structure 328
 Extended X-Ray Absorption Fine Structure and Near Edge X-Ray Absorption Fine Structure 18
 factor 713
 layers 358, 361,
 layers on bulk specimens 362
 magnetic ordering 249
 Melting 249
 or interface electric fields associated with surface or interface states and metallization 386
 order 260
 order-disorder transition 249
 orientation 265
 plasmons 327
 reconstruction 271
 roughness 265, 698
 segregation 240
 sensitivity 291
 states 328
 topography 54
 -analytical technique 350
- enhanced Raman spectroscopy 434
 and interfaces 503
 Survey analysis 586, 598
 Surveys 564
 Synchrotron radiation 18, 198, 199, 214, 230
 Synthetic multilayers 340
- T**
- TEAS 265
 TEM 135, 139
 Temperature 385
 Thermal-energy atom scattering 265
 Thermomodulation 388
 Thick or bulk specimens 361, 362
 Thin films 121, 199, 240, 357, 358, 361, 362, 402
 Threshold energy 138
 Tilted molecule 237
 Time-of-Flight Mass Spectrometry 552, 563, 586
 TOFMS 563
 Topographical variations in carrier concentrations 386
 Topography formation 704
 Toroidal high-resolution ion energy analyzer 507
 Total electron yield 231
 Total Reflection X-Ray Fluorescence Analysis 27, 349
 Total surface areas 737
 Trace impurities 675
 Trace level analysis 45
 Transitions that lead to luminescence 152
 Transmission 135
 Transmission electron microscopy 10, 121
 Transmission or scanning transmission electron microscope 135
 Transmittance 419
 Transverse geometry 727
 Trap states 386
 True secondaries 331
 TXRF 27
- U**
- Ultrahigh spatial resolution 147
 Ultrahigh vacuum 18, 231
 Ultratrace analysis 609
 Ultraviolet laser pulse 587

- Ultraviolet photoelectron spectroscopy 23
- Uniform ionization 572
- Uniformity characterization of luminescent materials 149
- Unit vectors 200
- UPS 23
- V**
- Vacuum ultraviolet light 562
- Valence band electrons 140
- bands 249
- EELS 327
- electron densities 140
- levels 285
- level spectra 303
- Vapor phase decomposition 352
- Variable-angle spectroscopic ellipsometry 31
- VASE 31
- VEELS 327
- Vibrational spectra 443
- Visual method 605
- VPD 352
- W**
- Water analysis 357
- Wavelength-dispersive spectrometry 179, 340, 425
- Wavelength-dispersive X-ray spectroscopy 103
- WDS 103, 125
- White lines 142
- Windowless EDS 141
- Working distance 77
- X**
- XAFS 215
- XANES 215
- XAS 215
- XPD 240
- XPS 22, 311
- X-ray absorption and enhancement effects 18, 343
- absorption fine structure 215
- absorption near-edge structure 215
- absorption spectroscopy 215
- Data Booklet 239
- Detection Systems 341
- diffraction 198, 252, 265
- fluorescence 26, 216
- generation 121
- generation range 130
- maps 72
- Microanalysis 166
- photoabsorption 215
- photoelectron diffraction 240
- photoelectron spectroscopy 22, 311
- Sources 340
- spectrum 358
- topography 3 210
- XRD 198
- XRF 26, 349
- XRF analysis of multiple-layer films 344
- XRF thin-film analysis 343
- Z**
- ZAF 132
- ZAF method 184
- ZnMnTe 393

ENCYCLOPEDIA OF MATERIALS CHARACTERIZATION

C. Richard Brundle

Charles A. Evans, Jr.

Shaun Wilson

Encyclopedia of Materials Characterization is a comprehensive volume on analytical techniques used in materials science for the characterization of surfaces, interfaces and thin films. This flagship volume in the Materials Characterization Series is a unique, stand-alone reference for materials science practitioners, process engineers, students, and anyone with a need to know about the capabilities available in materials analysis. An encyclopedia of 50 concise articles, this book will also be a practical companion to the forthcoming books in the Series. It describes widely-ranging techniques in a jargon-free manner and includes summary pages for each technique to supply a quick survey of its capabilities. Future Series titles are as follows:

- Characterization of Metals and Alloys
Paul H. Holloway and P. N. Vaidyanathan
- Characterization of Ceramics
Ronald E. Loehman
- Characterization of Polymers
Ned J. Chou, Stephen P. Kowalczyk, Ravi Saraf, and Ho-Ming Tong
- Characterization in Silicon Processing
Yale Strausser
- Characterization in Compound Semiconductor Processing
Yale Strausser
- Characterization of Integrated Circuit Packaging Materials
Thomas M. Moore and Robert G. McKenna
- Characterization of Composite Materials
Hatsuo Ishida
- Characterization of Tribological Materials
William A. Glaeser
- Characterization of Optical Materials
Gregory J. Exarhos
- Characterization of Catalytic Materials
Israel E. Wachs
- Characterization of Organic Thin Films
Abraham Ulman

ISBN 0-7506-9168-9



9 780750 691680

BUTTERWORTH
HEINEMANN

MANNING