

Subject and Author Index

Numbers refer to the page where a definition or explanation of and/or a *figure* or a **table** on a given subject is found. Author names are given with the number of the first page of the paper in which they are involved.

3D micro-XRF, 197

A

Acmite, ELNES, 90
 Adsorption
 of Ag islands, 346
 of Cu, 351
 of oligomers to step edges, 362
 Advanced photo source (APS), 171
 AFM *see* atomic force microscopy
 Ag₇ cluster, 348
 Almandine
 ELNES, 90
 Fe-*L*₂₃ edges, 89
 Alps Adula-Coma Lunga samples
 APDs, 45
 Analysis of Fe-bearing samples, 86–87
 Andradite
 Fe-*L*₂₃ edges, 89
 Anhydrite
 S isotope ratios, 155
 Anorthite
 APD value, 27
 Anthropogenic CO₂, 208
 Antiphase domains (APDs), 26, 27, 28
 APDs *see* antiphase domains
 Aqueous host
 nanoparticles in, 329
 Aqueous solutions
 molecular-scale growth of mineral
 surfaces in, 253
 Ar ion source, 130
 Archaeological applications of SIMS, 133
 Argon ion slicing (ArIS), 24
 Atomic and solid-state physics, 80
 Atomic force microscopy (AFM), 327, 240,
 242, 243
 Atomic-resolution AFM image, 247
 Atomic-scale environment, 325
 Au cluster source, 130
 Auger electrons, 59
 Augite, 32, 35, 37

B

BAA *see* beam acceptance aperture
 Background subtraction in EFTEM, 69
 Barite, 258
 S isotope ratios, 155
 Basaltic crust, 43
 Beam acceptance aperture (BAA), 3
 Beam pulsing, 118
 Becker, Udo, 325
 Bending magnets
 synchrotron, 171
 Bi cluster source, 130
 Biogeochemical C, N and S cycle, 158
 Biological applications of SIMS, 133
 Biological microstructures
 fast XFCT of, 206
 Biomineralization, 327, 361
 Birth-and-spread 2D nucleation model, 267
 Biswas, Subhashis, 325
 Bond lengths
 by EELS, 82–83
 Brenker, Frank E., 23
 Brightness
 brilliance, 173
 Brownmillerite, Fe-*L*₂₃ edges, 89
 Bunching of ions, 119

C

Calcite, 246,
 interface with organic molecule network, 367
 structure, 258
 surface etch pits, 294
 Cameca
 IMS xf ion microprobe, 148, 149
 NanoSIMS 50, 137, 148
 Carbon isotope ratios
 Celestite
 coupling between dissolution and growth, 307
 Chalcopyrite, S isotope ratios, 155
 Clinoamphibole, phase boundaries, 31
 Clinoenstatite, 34
 Clinopyroxene, phase boundaries, 31

- Coal-ash particles
 quantitative results, 196, **197**, 224
- Coarsening rate law, 28
- Collision cascade, 6, 112
- Coloumb energy, 330
- Compton intensity, 190
- Compton scattering, 210
- Computational background, 338
- Confocal imaging, 197–199, 200
- Congruent and complete decomposition, 290
- Coordinations
 by EELS, 82–83
- Copepod samples
 fast XFCT of, 206, 209
- Cosmochemical applications of SIMS, 133
- Coupling between dissolution and growth, 307
- Crystal bond, 24
- Crystal growth in the presence of impurities,
 277, 278
 in the presence of organic impurities, 279
- Crystal surfaces
 in AFM images, 245
 step motion on, 259
- Cs ion source, 130, 143
- Cu
 surface diffusion of copper nanoparticles, 350
- Cu stabilization in zeolites
 application of SR, 224
- D**
- DAC *see* diamond anvil cells, 18
- Dark-current intensity distributions, 75
- Dark-field electron micrographs, 28, 40, 44, 48
- Dark-field TEM images
 of APDs in pigeonite lamellae, 39
 of pigeonite exsolution lamellae, 38
 of clinopyroxene, 35
- Data correction and analysis, 75
- Decomposition
 congruent and complete, 290
- Density of states, 60
- Depth profiling, 124
 of an aerosol particle, 139
- Detection geometry in SR, 190
- Detection quantum efficiency (DQE), 73
- Diamond anvil cells (DAC), 18
- Diamond inclusions
 3D micro-XRF, 203
- Diffusion experiments and SIMS, 159
- Dimer, 333
- Diopside–hedenbergite, 42
- Dislocations, 7
- Dissolution at mineral surfaces, 239, 288
- Dissolution of a single Au nanoparticle, 354
- Distributions of Au nanoparticles, 350
- Doppler effect, 249
- DORIS ring, Germany, 170
- DQE *see* detection quantum efficiency
- Dual beam FIB instrument, 2, 5
- Duoplasmatron, 115, 143
- E**
- EBSD *see* electron back scatter diffraction
- EDS *see* energy-dispersive X-ray spectrometry
- EDX *see* energy-dispersive X-ray spectrometry
- EELS *see* electron energy-loss spectroscopy
- EFTEM *see* energy-filtered transmission electron microscopy
- EFTEM *see* energy-filtered transmission electron microscopy, 327
- Electron back scatter diffraction (EBSD), 5
- Electron energy-loss spectroscopy (EELS), 57, 58, 79
 ionizations edges, 64, 65
- Electron probe X-ray micro-analysis (EPXMA), 225
- Electron spectroscopic imaging, 96
- Electrons, 6
 plasma, 126
- Element
 mapping, 69
 quantification, 78
- Elemental analysis
 nanobeam XRF in, 181
- Elemental fractionation, 123
- Elemental maps from XRF microtomography, 230
- ELNES *see* energy loss near edge structure, 67
- Energy loss near edge structure (ELNES), 66
- Energy loss
 in ion-solid interaction, 6
- Energy spectrum of ions, 111
- Energy-dispersive X-ray spectrometry (EDX), 5, 327
- Energy-filtered transmission electron microscopy (EFTEM), 57–58, 67
- Enstatite, 34, 36, 50, 51
- EPXMA *see* electron probe X-ray micro-analysis
- Etch pits, 293
- European synchrotron radiation facility (ESRF), 171
- EXAFS *see* Extended X-ray absorption fine structure
- Excitation process, 62
- Exhumation, 23
- Exsolution, 30
- Extended energy loss fine structure (EXELFS), 66
- Extended X-ray absorption fine structure (EXAFS), 66, 211, 216, 221, 330
- Extraterrestrial applications of SIMS, 133
- F**
- Fano resonance, 66
- Fe- L_3 spectrum, 98

- Ferrobustamite–hedenbergite, 40, 41
 Ferrosillite, 36
 FIB *see* focused ion beam
 FIB200 TEM
 focused ion beam device, 3, 4
 Focused ion beam (FIB), 1, 24
 Foil lift-out technique, 13
 Fourier filtering of the EXAFS signal, 220, 222
 Fundamental parameter method, 194
- G**
- Ga ion gun, 115, 130
 Galena
 S isotope ratios, 155
 Gallium ion beam
 focused, 1
 Garnet
 ELNES, 90, 96
 Gatan imaging filter (GIF), 73, 74
 Geodynamic parameters, 23
 Geological applications of SIMS, 133
 Geological dating and SIMS, 151
 Geological implications for nanoparticle–host interactions, 360
 Geoscience applications of the ion microprobe, 137, 150
 Gibbs factor, 270
 Gold nanoparticle, 333
 Gold
 invisible, 327
 Golla-Schindler, Ute, 57
 Growth
 in the presence of organic impurities, 281
 of solid solutions at nano-scale, 285
 sequence on barite, 276
 Gypsum
 terraces, 246,
 S isotope ratios, 155
- H**
- HAADF-STEM *see* high-angle annular dark field scanning transmission electron microscopy
 HAFM *see* hydrothermal atomic force microscopes
 Hedenbergite, 42
 ELNES, 90
 Fe- L_{23} edges, 89
 Hematite
 quantitative distributions, 102
 Henkel
 Torsten, 111
 Hercynite, 78
 Fe- L_{23} edges, 89
 High-angle annular dark field scanning transmission electron microscopy (HAADF-STEM), 327
 High-resolution TEM images of two AuNPs, 357, 369
- Hoppe, Peter, 137
 HSSYLAB synchrotron facility, 193
 Hydrothermal atomic force microscopes, 244
- I**
- ID18F station
 ESRF, 180, 226
 Ilmenite
 quantitative distributions, 102
 Infrared (IR), 1
 Inner-shell ionization, 81
 Insertion devices
 synchrotron, 173, 175
 Instrumentation for EELS and EFTEM, 70
 Invisible gold, 327
 Ion channelling, 10
 Ion exchange at phlogopite surface, 300
 Ion gun, 115
 Ion implantation, 6, 325
 Ion microprobe analysis, 137
 Ion thinning, 23
 Ion-beam synthesis of nanoparticles, 368
 Ionization edges, 64, 65
 Ionization process, 121
 Ion-replacement reactions, 301
 Ion-solid interaction, 6, 6
 IR *see* infrared
 Irradiation damage, 7
 Islands on calcite, 272
 Isotopic fractionation, 123
- J**
- JEOL 3010 TEM, 73
 Jordan, Guntram, 239
 Jump ratio images, 71
- K**
- Kinetic models, 262
 Kinetics and mechanisms of growth and dissolution at mineral surfaces, 239, 250
 Kinks, 245, 255
 Kossel crystal, 256
 Kramers-Kronig relation, 62
- L**
- Langmuir film, 365
 Langmuir–Blodgett films, 327
 Lateral force microscopy (LFM), 244
 Lateral resolution of EELS, 97, 103
 Lattice parameters, 32
 LFM *see* lateral force microscopy
 Linear polarization in SR, 190
 Liquid metal ion gun (LMIG), 115
 Liquid metal ion source (LMIS), 2

LMIG/LMIS *see* liquid metal ion gun/source
 Local density of states (LDOS), 336, 349
 Lyon, Ian, 111
 Lysozyme, 246

M

μ -EXAFS *see* microscopic extended X-ray
 absorption fine structure, 231
 μ -XANES *see* microscopic X-ray absorption
 near-edge spectroscopy
 μ -XRD *see* microscopic X-ray diffraction
 Magnetite
 ELNES, 90
 Martensitic transformation mechanism, 42
 Mass resolution, 115, 117
 Melting behaviour of isolated Au particles, 328
 Metal cluster deposition on molybdenite surfaces,
 339, 352
 Metal nanoparticles in two dimensions, 337
 Microbeam XRF in elemental analysis, 181
 Microscopic extended X-ray absorption fine
 structure (μ -EXAFS), 231, 232
 Microscopic X-ray absorption near-edge
 spectroscopy (μ -XANES), 229, 230
 Microscopic X-ray diffraction (μ -XRD), 228
 Microscopic X-ray fluorescence tomography, 228
 Microscopic X-ray fluorescence (μ -XRF), 175
 Micro-XRF *see* microscopic X-ray fluorescence
 Mineral hosts, interaction of nanoparticles with, 370
 Mineral surfaces
 at nano-scale, 239
 cleaved, 246
 molecular-scale growth of, 253
 Molecular dynamics, 326
 simulation of a gold cluster incorporated into
 pyrite, 359, 360
 Molecular-scale, growth of mineral surfaces, 253
 processes, 241
 Molybdenite, metal cluster deposition on, 339
 Monte Carlo simulation, 181, 184
 Mössbauer spectroscopy, 333

N

Nano-analysis, 1
 Nanobeam XRF in elemental analysis, 181
 Nano-characterization, 1
 Nano-machining, 1
 Nanoparticle-host interactions in natural systems, 325
 Nanopetrology of pyroxenes, 23
 Nanoscale, determination of Fe³⁺/ Σ Fe ratios, 57
 interactions, 241
 mineral surfaces at, 239
 NanoSIMS
 element/isotope distribution map, 157
 ion images, 138
 Nanospectroscopy, 169

National synchrotron light source, USA, 170
 Neutral atom population, 126
 NIST SRM 1832, standard reference material, **181**
 Non-resonant ionization, 128

O

O ion source, 130, 143
 Oceanic crust, 43
 O isotope ratios, 154
 O-lattice theory, 30
 Oligomers
 adsorption to step edges, 362
 Olivine and ion microprobe, 154
 Omega-type energy filter, 73, 74
 Omphacite, 43, 44
 APD value, 27, 30
 Optimized phase boundary theory, 33
 Organic impurities
 crystal growth in the presence of, 279
 Organic molecule network-calcite interface, 367
 Orthoclase
 Fe-L₂₃ edges, 89
 Ostwald ripening of Au nanoparticles, 354, 355

P

Periclase, EELS spectrum, 60
 Periodic bond chain theory, 257
 Phase boundaries, 31
 Phase diagrams of omphacite, 46–47
 Phlogopite surface dissolution, 294
 Phonons, 6
 Phosgenite, dissolution of, 309
 Photon Factory, Japan, 170
 Pigeonite, 37
 APD value, 27
 exsolution lamellae, 32
 Pina, Carlos M., 239
 Plasmons, 6
 Point defects, 7
 Polluted soils
 Cu stabilization in zeolites in, 224
 Polycapillary detector optics, 201
 Protonation front, 301
 Pulsed extraction of ions, 119
 Pyrite
 S isotope ratios, 155
 Pyroxene, 23
 Pyroxene, 37
 microstructures, 35
 Pyrrhotite
 STM image of, 332

Q

Quantification algorithm, 195
 Quantitative point analysis, 95

- Quantitative trace-element analysis using iterative MC simulation, 193
- Quantitative valence-state mapping, 104
- Quantum mechanical calculations, 335, 344, 345, 349
- Quantum mechanical treatment, 111
- Quartz inclusions, 3D micro-XRF, 203
- R**
- Radiation, 169
- Radioactive isotopes and SIMS, 151
- Rare earth element detection limits using XRF, 192
- Rayleigh scattering, 210
- Reflectrons, 113, 114
- Regression with standard spectra, 95
- Reich, Martin, 325
- Relative sensitivity factors (RSFs), 113, 141, 123
- Relativistic charged particles, 169
- Resolution limit for AFM, 247
- Resonance ionization, 127
- S**
- SAED pattern of clinopyroxene, 35
- Sample lift-out, 10, 12
- Scanning electron microscopy
back-scattered electron images, 153
- Scanning electron microscopy images, 125
- Scanning transmission electron microscopy, 57, 327
- Scanning tunnelling microscopy, 240
of pyrrhotite, 332
- Scattering geometry, 62
- Screw dislocations, 267
- Secondary ion energy spectrum, 112
- Secondary ion images, 138
- Secondary ion mass spectrometry (SIMS), 111, 137, 333
- Secondary ions, 121, 131
- Silver islands
STM image, 340
- SIMS *see* secondary ion mass spectrometry
- Single particle dissolution, 354
- Single-beam FIB instrument, 2
- Sinha, Bärbel, 137
- Skiagite
ELNES, 90
- Solid solutions, growth of
at nano-scale, 285
- Spatial resolution, 119
- Sphalerite
S isotope ratios, 155
- Spinel
ELNES, 90
- Spiral growth model, 270
- SPring-8, synchrotron
Japan, 171
- Sputtered neutral mass spectrometry, 126
- Sputtering
preferential, 122
- SR *see* synchrotron radiation, 169
- Stable isotope measurement, 152
- Standard reference material, 181
- STEM *see* scanning transmission electron microscopy
- Step edges
adsorption of oligomers to, 362, 364
- Step kinematics, 249
- Step motion on crystal surfaces, 259, 263
- Steps, 245, 255
- Storage ring
synchrotron, 170
- Sulphide surfaces, 333
- Sulphur isotope ratios, 155
- Supersaturation function, 287, 289
- Supersaturation, 254
- Synchrotron beamline, 171
- Synchrotron micro-XRF, 176
- Synchrotron radiation (SR), 169
- Systematics of nanoparticles, 370
- T**
- TEM *see* transmission electron microscopy
- Terrace-ledge-kink, 256
- Terraces, 245, 255
- Thermal history of a rock sample, 35
- Thermodynamics of Au adsorption, 335
- Thermometer, 34
- Third-generation SR, 171
- Time of flight secondary ion mass spectrometry (TOF-SIMS), 111
- Titanohematites
exsolution phenomena, 95
- Tomography (XRF), 197
- Topografiner, 240
- Trace element abundances, 156
- Transmission electron microscopy (TEM), 1, 23–25, 49
foils, 35
microstructures, 327
- Twinning, 34
- U**
- Ultraviolet electron spectroscopy (UPS), 338, 343
- UPS *see* ultraviolet electron spectroscopy
- V**
- Valence-state distribution, 105
- Valence-state mapping, 57
- Valencies
by EELS, 82–83
- Van Aken, Peter A., 57

W

White-line intensity ratios, 92, 93
Wigglers/undulators, 171, 174
Wirth, Richard, 1
Wollastonite, 36
Wood fly-ash particles
 quantitative results, 196, **197**

X

XANES *see* X-ray absorption near edge structure
XAS *see* X-ray absorption spectroscopy
XFCT *see* X-ray fluorescence computed
 tomography
XPS *see* X-ray photoelectron spectroscopy
X-ray absorption near edge structure (XANES),
 211, 214
X-ray absorption spectroscopy (XAS), 63, 210, 213

X-ray diffraction, 240, 330
X-ray fluorescence (XRF), 59
X-ray fluorescence computed tomography (XFCT),
 206, 207
X-ray fluorescence, microscopic, 175
X-ray photoelectron spectroscopy (XPS), 333
X-ray quanta, 59
X-ray tubes, 170
XRF microtomography, 230
XRF *see* microscopic X-ray fluorescence
XRF *see* X-ray fluorescence

Z

Zeiss LIBRA 200 TEM, 73
Zeolite, SEM images, 226
Zero-loss peak (ZLP), 59, 61
ZLP *see* zero-loss peak