

Index

Symbols

$(1-x)\text{Ta}_2\text{O}_5 \cdot x\text{Al}_2\text{O}_3$, 188, 190, 191, 193

$(1-x)\text{Ta}_2\text{O}_5 \cdot x\text{WO}_3$, 187

1/1–1/1–1/1 approximant, 110

d-Al–Ni–Co, 274–276, 280–282

i-Al–Cu–Fe, 275–277, 279–281

i-Al–Pd–Mn, 270

i-Al–Pd–Re, 275–277, 280, 281

ϵ_{16} phase, 235

τ^2 -Al₃Co, 237

Λ -direction, 31

A

ABC-star polymers, 117

Acetylene, 270

Al, 270

Al–Co–Ni, 219, 270

Al–Cu–Fe, 275

Al–Ni–Co, 275

Al–Pd–Co, 133

Al-based quasicrystal, 81, 82, 86

Al₁₃Co₄, 241, 270

Al₄(Cr,Fe), 163, 164

AlCo, 273

Alkane/urea inclusion compounds (UIC), 171

AlPd, 270

Ammann–Beenker tiling, 31, 49, 50, 56,
59–61, 63, 64, 203, 206, 208, 209

Analysis, 276

Anderson–Putnam method, 71

Anomalous diffusion, 91

Approximant, 7, 229, 237, 270

Arrhenius law, 256

Asymptotic growth behaviour, 46, 47

Atomic modulations, 190

Atomic radius, 200

Atomic surfaces, 5

Autocorrelation, 13, 14, 24

Average structure, 163, 164, 167–169

Average unit cell, 125, 126, 131, 150, 203,
205, 206, 208, 209

B

B20 compounds, 272

Binary system, 149

Block co-polymer micelles, 117

Block inflation, 12

Bond-orientational order, 230

Boson peak, 75–78

Bragg peaks, 119

Burgers circuit, 118

Burgers function, 119

Burgers vector, 118, 119

C

Cartwheel pattern, 52, 54, 56

Catalysis, 269, 270, 272, 273, 275, 276

Cationic distribution, 150

Cd–Ca, 101, 198

Cd–Yb, 198

Cd₆Ca, 101, 195–197

Cd₆Y, 195–197, 199

Čech cohomology, 71

Closeness condition, 7

Co, 273

Coincidence site lattice, 44

Colloids, 261–265

Complex intermetallics, 269

CoO₅ pyramidal arrays, 160

Crenel function, 151, 152

Critical reciprocal lattice, 101

Cross ratio, 31

Crystal, definition, 1, 123

Crystallographic superspaces, 171

Cs-corrected scanning transmission electron microscopy (STEM), 219, 229
Cyclotomic Delone set, 31

D

Decagonal, 270, 275, 280, 281
Decagonal quasicrystal, 4, 219, 237
Delone set, 30
Dendrimers, 117
Density functional, 197
Determined, 32
DFT calculations, 270
Differential thermal analysis, 141
Diffraction, 14, 23, 35
Diffraction measure, 36
Diffraction pattern, 211, 213, 214, 216
Diffraction solution class, 35
Diffuse scattering, 243–246, 249, 250
Dirichlet series, 45
Discrete parallel X-ray, 31
Discrete tomography, 29
Dislocation, 117, 119
Displacive modulation, 152
Dodecagonal quasicrystal, 120
Dodecahedral spin cluster, 75–77, 79
DOS pseudogap, 111
Double perovskite-type cobaltates, 157
Dynamical flexibility, 253–255, 257, 258
Dynamical zeta function, 71

E

Electron backscatter diffraction, 133, 141
Electronic transport, 89
Electrons per atom ratio (e/a), 95–97, 99–101
Energy dispersive X-ray analysis, 133, 276, 277
Entropy, 20
Ethylene, 270

F

Fermi diameter, 101, 109
Fermi surface–Brillouin zone interactions (Fs–Bz), 95–97, 99, 101, 110
Five-fold symmetry, 270
FLAPW, 96, 101, 102, 110, 111
Fourier expansion, 118
Fourier module, 5
Fourier transform, 14, 36
Free energy, 121

G

Gag protein, 243
GdBaCo₂O_{5+ δ} , 158
Generating function, 46, 47

Global empire, 52, 56
Grassmann coordinates, 62, 63
Grid, underlying, 50, 51, 53, 54, 56

H

HAADF (high-angle annular detector dark-field), 219
HAADF-STEM, 237
HFM, 50–52, 56
High resolution diffraction methods, 171
High resolution transmission electron microscopy, 29
Homometry, 35
Hull, 23
Hume–Rothery electron concentration rule, 109
Hume–Rothery plot, 95, 96, 98, 99, 104, 111
Hume–Rothery stabilization mechanism, 100, 101, 114
Hydrogen, 271
Hydrogenation reactions, 269
Hypercubic tiling, 90

I

Icosahedral, 275–277, 279
Icosahedral quasicrystal, 4, 203, 205, 209, 270
Incommensurate composites, 3, 6, 171, 187, 189
Incommensurate spin wave, 4
Incommensurately modulated phases, 2, 6, 171, 213
Interference phenomenon, 102
Inverse problem, 29, 35
Islamic architecture, 49–51, 56
Islamic patterns, 49

J

JANA2006, 188

L

Labyrinth tiling, 90
Langmuir–Hinshelwood mechanism, 271
Laser field, 262, 263
Lattice periodicity, 1
Leaching, 275–282
Liquid crystals, 117

M

Mackay icosahedron, 102
Magic number, 29, 34
Magnetic superspace group, 7
Matching condition, 102, 112
MD simulation, 256, 257
Mean square displacement, 91, 93
Mesoporous silica, 117

- MI-type approximants, 101
 Misfit structures, 3
 Mn, 273
 Model set, 29
 Modulation wave vector, 151, 153, 188, 193
 Molecular dynamics (MD) simulations, 253
 Molecular envelope, 248
 Molecular scattering factors, 244
- N**
n-cyclotomic Delone set, 30
n-cyclotomic model sets, 31
 Nanoparticles, 117, 275, 276, 278, 281, 282
 Neutron diffraction data, 188, 190
 Non-periodic tiling, 59–61
*n*th cyclotomic field, 30
- O**
 Occupational modulation, 151
 One-parameter family of tilings, 59
 Orbital hybridization, 101, 111
 Order–disorder transition, 195
 Oxygen deficiency, 159
- P**
 Pauling, 110
 Pd, 270
 Penrose tiling, 3, 31, 49, 50
 Pentagonal and the banana-shaped tiles, 235
 Period doubling sequence, 38
 Phase transitions, 8, 171, 173, 196
 Phases
 θ -Al₂Cu, 141
 Al₅Co₂, 141
 B2, 141
 m-Al₁₃Co₄, 141
 Phasonic drift, 261, 263–265
 Phasons, 261
 Photonics, 117
 Plücker relation, 62
 Poisson summation formula, 38
 Pseudogap, origin, 102, 113
- Q**
 Quasiperiodic patterns in Islamic art, 49–52, 54
 Quasicrystals, 29, 59–61, 125, 211–214, 275
 decagonal (D), 141
 Quasielastic neutron scattering (QENS), 253, 255, 256
- R**
 Random substitution, 20
 Rank, 5, 118
 Raynor, 109
 (reciprocal) lattice, 118
 Return probability, 91, 93
 Reverse Monte Carlo, 243, 245
 Rhombic triacontahedron, 102
 Rhombus tilings, 61
 Riesz product, 15
 Rietveld method, 180, 183, 187
 RMC, 245–250
 Robinson tilings, 68
- S**
 Sabatier principle, 272
 Scaling, 211, 212, 214–217
 Scanning electron microscopy (SEM), 133, 141, 275–277
 Separable quasiperiodic tilings, 90
 Shadow, 62–64
 Shield tiling, 31
 Short-range spin fluctuation, 75, 77
 Singular continuous, 14
 Slow dynamic mechanism, 82
 Soft-matter quasicrystals, 117
 Solid solution, 191
Sp-states, 200
 Space group symmetries, 180
 Space-time symmetries of electrodynamic systems, 6
 Spectral dimensions, 93
 Spin wave, 4
 Squirrel tiling, 12
 Sr₃TiNb₄O₁₅, 179–184
 Steam reforming of methanol, 276
 Structure model, 50, 164
 Structure refinement, 125
 Sublattice, 44
 Subperiods, 62
 Substitution, 19
 Substitution matrix, 22
 Substitution rule, 11, 69
 Subword frequency, 22
 Superspace formalism, 4, 150, 154
 Superspace group, 5
 Superspace model, 151, 154
 Superstructure, 164, 167–169
 Surface, 273
 Surface of a complex intermetallic compound, 270
 Synchrotron X-ray diffraction, 189, 191
 Synchrotron X-ray powder diffraction data, 180, 182, 184, 188
- T**
 Tempered distribution, 39

Temporal autocorrelation function, 91
Tetrahedron dynamics, 253–259
Tetrahedron method, 95, 96
Thue–Morse, 11
Tiling space, 69
Time reversal operator θ , 7
Transmission electron microscopy (TEM),
117, 120, 133
Tsai-cluster, 195, 197, 198
Tsai-type Cd_6Ca approximant, 101
Tsai-type QCs and approximants, 195
Tübingen triangle tiling, 31
Tungsten bronze, 179

U

U -polygon, 32
Unique reconstruction, 29

V

Variable temperature investigation, 193

W

W-(AlNiCo), 237
Well-rounded, 43
WIEN2k, 95, 96, 102, 111
Wiener diagram, 36
Winding numbers, 119

X

X-ray diffraction, 133, 141
X-ray photoelectron spectroscopy, 275, 276
X-ray photoemission spectroscopy, 277

Z

Zeta function, 45, 71
Zn–Mg–Tb quasicrystal, 75
Zn–Sc, 200
Zn₆Sc compound, 110
Zn₈₈Sc₁₂, 200