

Index

a

absolute configuration 2, 23
 absolute configuration, determination 220
 absolute enantioselection 18ff
 achiral components 19, 30ff, 46f, 55f, 218,
 234f, 315f, 392
 AFM 107, 119, 131f, 294
 Ag(I) 268
 aggregate-induced enhanced emission,
 AIEE 71
 alaninate 201f
 alanine 202
 alignment 176
 aluminosilicate zeolite 397f
 amine 72
 amino acids 3, 19, 264ff
 – N-acyl- 253f
 – Brewster angle microscopy 253
 α -amino acid 129, 249, 257f
 – C₁₆-Gly 249ff
 – C₂₉-Lys 251
 – C_n-Lys 250f
 – herring-bone motif 252
 – monolayer 249f
 β -amino acid 129
 amphiphile 248ff, 254
 – 2D self-assembly 248f
 – C₁₈-Glu-NCA 266f
 – molecular packing 248
 amplification (of chirality) 37, 116, 118ff,
 138f, 147, 281, 368
 angular momentum, L 10
 anisotropy
 – factor 76
 – photo-induced circular 282ff
 anticlinic tilt 278
 anticonglomerate 325
 antiferroelectric switching 276ff, 290

antiparticles 9, 14f
 association lifetimes 29, 34
 asymmetric catalysts 67, 83f
 asymmetric synthesis 21, 403
 atropisomers 353, 361
 azobenzene 98, 158, 282, 354
 azopolymer 151

b

B4^[*] phase 292f
 Bailar twist 36
 band gap material 85
 barbiturate 37f, 46f
 benzene tricarboxamides 118
 β -decay 14
 β -peptides 22
 bilayer aggregates 164f
 binaphthyl 366, 394
 BINAS 76f
 BINAP 76f, 80, 85, 406
 binding site 276f
 BINOL 60, 395ff
 bistability 351ff
 block co-polymer 161, 168f
 – amphiphilic 165
 – hydrophilic 173
 blue phase 274f
 bottom-up 70
 Boulder model 276ff
 binary system 322ff
 breaking
 – chiral symmetry 16
 – mirror-symmetry 16

c

C₂-symmetry 276
 C₃-symmetry 284ff
 C₁₅-Lys/alanine 257

- C₁₅-Lys/serine 257
 C₁₅-Lys/valine 257
 calcium tartrate tetrahydrate 173
 calix[4]arene 41ff, 52
 camphor sulfonic acid 127, 141
 capsule (molecular) 39ff
 catechol 44f
 cation-π interaction 33
 cavity 40, 174, 204
 CD, *see circular dichroism*
 charge conjunction 9ff
 chelate 43
 chemisorption 221
 chiral
 – architecture 116ff
 – additive 336
 – adsorption 192
 – aggregate 134ff, 157, 169ff
 – amnesia 294
 – assembly 117f
 – bilayer effect 108
 – bridging ligands 392ff
 – capsules 37ff
 – channels 399
 – counterions 320f
 – discrimination 87
 – domains 279, 292
 – external stimulus 150
 – faces 7
 – footprint 79
 – framework 394
 – memory effect 46ff, 118, 154ff
 – monolayer 247ff
 – solvents 124, 150ff
 – superstructure 274f, 290ff
 – trigger 152
 chirality 1ff, 8ff, 30f, 273
 – axial 274, 280
 – conformational 273ff, 280ff
 – control 117
 – false 13ff, 18, 20
 – induction 117, 136
 – inversion of 294
 – layers of 273, 290ff
 – planar 274
 – switching 117, 160
 – transfer 279ff, 298
 – true 13ff, 18f
 chirality in two dimensions 17f
 chiroclinic effect 291
 chiroptics 21, 74ff, 349ff
 chiroptical switches 161, 349ff
 cholestryl-S-glutamate (CLG) 258ff
 chromatography 81
 chromophore 176ff
 – perylenediimide 177
 cinchonidine 84f
 circular dichroism 22, 86, 98, 102ff, 110,
 292ff, 356, 365
 – second-harmonic generation 292
 circularly polarized light 1, 151f, 160, 350ff,
 366ff
 – photons 19
 circularly polarized luminescence 371
 click chemistry 129
 cluster 80ff, 196ff
 – coordination 80ff
 – organometallic 80f
 cocystal 316f
 columnar phase (Col) 273, 282ff, 297
 – helix formation 284ff
 conductivity 120, 124ff
 conformation chirality 273ff, 296
 – hypothesis 296ff
 – propeller-like 284
 – twisted 296
 conglomerate 2, 205, 231, 287, 313ff, 324
 – dark phase 292ff, 298
 conjunction 9ff
 – charge, C 9
 control
 – kinetic 21
 – thermodynamic 21
 cooperative effects 116
 coordination bonds 54
 Cotton effect 52
 Coulomb attraction 195
 covalently connected chiral nanostructures
 199ff
 CP violation 15, 21
 CPT theorem 10ff
 o-cresol 84
 crosslinking component 122, 143,
 167ff
 crown-ether side group 143
 Cu(I)/Cu(II) redox couple 365
 cubic phase 273, 276, 296ff
 cyanine 169
 cyanurate (CYA) 37
 cyclodextrin 340, 357
 cyclohexanediol 58f
 cyclophane 259ff
 cysteine 205
- d**
 D-ribose 4
 defect lattice 275
 dense packing 225

- density functional theory (DFT)
 calculations 75, 80, 193, 201, 209f
 deracemization, *see* resolution
 deswelling 122
 diacetylene 119
 diaminocyclohexane 103
 diarylethene 359
 diastereomeric complexes 209f, 308, 317, 331
 diastereomeric film 255
 – 4-tetradecylphenethylamine 255
 – 5-pentadecylmandelic acid 255
 diastereoselectivity 30, 52, 54, 59, 361
 dichroism 7
 – electronic circular 74
 – magnetochiral 7, 13
 – vibrational circular 74
 dimelamine 37f
 dimensions 17
 disc-like mesogen 271ff
 dissymmetric 2ff
 dopant, chiral 125, 280, 291, 385
 – type I 280
 – type II 280
 doping 120, 134f
 DNA 4f, 20, 30, 115, 169ff
 double helix 4, 355, 357
 double salt 332ff
 drugs 29
 Dutch resolution 318ff
 dye 169, 171ff
 dynamic equilibrium 33, 46, 52
- e**
- ECD, *see* electronic circular dichroism
 elastomers 122
 electric dipole interactions 18, 23
 electric field, E 11
 electrochiropical switching 364ff
 electroclinic effect 279, 290
 electron microscopy 293
 electronic circular dichroism 74ff, 82
 electrons
 – spin-polarized 17ff
 electrostatic interactions 311, 400
 enantioenrichment 6
 enantiomer 2ff, 14ff, 75, 80f, 266
 – excess 6ff, 81
 enantiomorphism 2ff, 10ff, 221, 308, 393
 – time-invariant 3
 – time-noninvariant 3
 enantioselection 18, 403
 enantioselective recognition 52f, 57
 enantioselective sorption 397f
 encapsulation 31, 39ff, 51f, 56, 58ff
- double 58
 – triple 59
 entropic effects 33
 entropy-driven 323
 epoxidation 397, 401ff
 equilibration 49, 56
 equilibrium 323
 – eutectic 324, 332f
 – external stimulus 143, 150, 154f
- f**
- Faraday rotation 2
 Fe atom 197
 ferroelectric switching 276ff, 290
 fibers 93ff, 103ff, 305, 362, 364
 fibril bundle 123ff
 film 240, 247ff, 256ff
 – diastereomeric 255ff
 – interdigitated bilayer 261ff
 – interdigitated multilayer 261ff
 – Langmuir 255, 258, 268
 – Langmuir-Blodgett (LB) 254, 264
 – Monolayer 228, 237, 255
 – Z-type 254
 fluorescence 70f, 82, 168, 178, 370
 foldamer 147ff, 176, 179
 forces 4
 – electroweak 4
 fullerene 101f, 140, 143, 160
- g**
- gas-adsorption 395
 gearing systems 373
 gel 93ff, 138, 143f, 160f, 174, 287
 germanium oxide 398f
 glucose 149
 L-glutathione (GSH) 76
 glycoluril 39f
 gold surface 205f, 380f
 graphite 219ff
 grafting 146
 grazing-incidence X-ray diffraction, GIXD 249ff
 guest 31, 36f, 40
 guest-host interaction 279
- h**
- H-type aggregation 109
 Hamiltonian 14, 16
 helical 3, 6, 14, 16, 95ff, 105ff, 116ff, 295
 – architecture 95, 116ff, 120, 123, 133
 – assemblies 95ff, 140
 – channels 399
 – coordination polymers 393

– filaments 286ff
 – pitch 275, 280, 294
 – ribbons 287, 293
 – supramolecular assemblies 117, 170, 275ff, 281ff, 297
 helical twisting power (HTP) 124, 275, 384
 helicene 2f, 55ff, 203, 282f
 helicity 95ff, 105ff, 153ff
 helix inversion 116, 154f, 375ff
 heterochiral racemic assembly 58, 207, 210
 heterogeneous asymmetric catalysis 392
 heterogeneous equilibria 305ff, 326
 hexabenzocoronene (HBC) 120
 hexahelicene 2f, 8
 hierarchical 120, 139, 191f, 197f, 305, 362, 372
 homochiral columns 321
 homochiral surface 200
 homochirality 4, 6ff
 host-guest chemistry 36, 43f, 338f
 hydrogels 110, 159f
 hydrogen bond 31ff, 105, 108, 117, 129ff, 155, 192, 206f, 224f, 252, 262, 309ff, 355
 hydrogenation 84
 – aromatic 83
 – asymmetric 83, 404, 406
 hydrophobic effect 33

i

immobilization 380, 400ff
 inclusion complex 147ff
 interdigitated bi- or multilayer film 261ff
 – acid-base complementarity 261
 – diastereoisomeric salt 261
 – crystalline trilayer 261
 interdigitation 230, 262ff
 – octadecanesulfonate/guandinium monolayer 262
 induction (of chirality) 46f, 123ff, 149
 information storage 115, 117, 154
 interaction
 – acid-base 137f, 141
 – cooperative 143
 – electron donor-acceptor 283
 – electroweak 14f
 – host-cation 143
 – hydrogen-bonding 140, 147, 149
 – hydrophobic 140, 169, 173
 – ionic 140
 – noncovalent 93, 116ff, 129, 137, 146, 305f
 – π - 116, 125, 129, 135
 – solvophobic 93f, 147ff
 – weak neutral current 16, 20
 intermolecular forces 31f, 197, 207

interpenetration 394f
 ion exchange 391f, 404
 N-isobutyryl-cysteine (NIC) 75
 isocyanodipeptide 129ff, 165

j

J-type aggregation 82, 100
 Jaeger's dictum 19

k

kinetic control 21, 37, 46, 129, 170f, 235, 305, 333ff
 kinetic resolution 85, 336

l

Langmuir monolayer 249, 254
 lanthanide 314
 LEED, *see* low-energy electron diffraction
 ligand 34ff, 44, 72, 76ff, 310ff, 365, 392ff
 light-induced switching 107
 limonene 29, 53f, 124
 linear momentum, **P** 10
 liquid crystal, LC 68ff, 85f, 121ff, 159, 161, 163f, 271, 287, 298, 351, 358, 372, 384
 – cholesteric 20, 125f, 138, 372
 – lyotropic 271, 287
 – nematic 20, 124, 126
 – thermotropic 271, 287
 lithography 71f
 “lock and key” 4, 207
 low molecular weight gelators (LMWG) 93ff
 low-energy electron diffraction 192, 202
 luminescence 351, 370f

m

machine, molecular 350, 373f, 380
 macromolecules 115f, 129f, 351
 magnetic field, **B** 2f, 11ff, 20, 240
 magnetochiral phenomena 7, 13f
 majority rules 6, 17, 234
 major symmetry directions 219ff
 MALDI-MS *see* matrix assisted laser desorption-ionization time-of-flight mass spectrometry (MALDI-MS) 266
 Mauguin effect 281
 mechanical motion 355, 373
 mechanical properties 94
 memory effect 46ff, 118, 154ff
 menthol 123
 p-mercaptopbenzoic acid (*p*-MBA) 79f

- mesogen 121ff, 271ff
 – amphiphilic 273
 – banana-shaped 287
 – bent-core 271, 280ff, 288ff, 295ff
 – block 163f
 – dendritic 282ff
 – disc-like (discotic) 271, 282ff
 – rod-like (calamitic) 271, 295
 – star-shaped 284ff
 mesophase 121ff, 129, 134, 162ff, 273, 275ff, 290ff
 – chiral 151, 275
 – cholesteric 121ff, 133, 139, 151, 153, 155, 160ff, 275
 – columnar 133, 284
 – cubic 273
 – helical 160
 – hydrogen-bonding 177
 – isotropic 276, 295
 – lamellar 287
 – lyotropic 129, 133, 160
 – nematic 124, 139, 283ff, 295
 – SmC* 163
 – smectic 131, 289ff
 – TGB* 151
 metal–ligand coordination 33, 43, 49f, 53, 60, 197
 – M₄L₆ tetrahedral assemblies 43, 50
 metal-organic frameworks (MOFs) 392ff
 metastable equilibria 325f, 331f, 363
 micelles 165, 168, 176, 400
 microscopic reversibility 21
 Moiré pattern 222, 283
 molecular imprinting 174
 molecular modelling 203
 molecular recognition 30, 51, 205, 210, 256, 339, 351
 – at the air/water interface 255f
 – cholesteryl-S-glutamate 258
 – syn and anti serine-Cu complexes 258
 molecular wire 149
 monoterpene 147
 montmorillonite clay 404
 motors, molecular 152, 349, 373ff
 N-methylnicotinium 50
 multiple chiral centers 224
 multicomponent assembly 237
 mutarotation 149
- n**
- nanocluster 76, 78f
 nanoparticles, NP 67ff, 380
 – gold 68, 380f
 – inorganic 74ff
 – organic 68, 71f, 81ff
 nanoporous materials 391ff
 nanorod 69
 nanoscale segregation 161f
 nanotechnology 6, 9, 12, 14, 111
 nanotubes 394
 nanowire 192
 – silver 176
 nematic phase 86, 124ff, 273ff, 281ff, 293ff, 373
 noncovalent domino effect 143
 noncovalent synthesis 31, 94, 308
 – diastereoselective 30f
 – enantioselective 30f
 nucleic acids 4f
 nucleation 72, 218, 248, 264, 308, 317ff, 328
 nucleation, inhibition of 336
- o**
- odd-even effect 123, 237f
 olefin epoxidation 397
 oligoglycine 140
 oligopeptide 120, 133, 266
 oligothiophene 97, 175
 optical activity 1ff, 14, 16, 22f, 75ff, 127ff, 133, 150ff, 294ff
 optical rotation 1ff
 – natural 10ff
 optical rotatory dispersion 22
 OPV 105ff, 179f, 225
 ORD *see* optical rotatory dispersion
 organogel 94ff, 362
 origin of life 6, 265
- p**
- packing coefficient 51ff
 packing constraints 230, 284
 parity, *P* 4, 7, 9ff, 14f, 17ff
 – violation 7, 14f
 parity-violating energy difference (PVED) 15, 20
 particles 9
 – monodisperse 74
 Pasteur 1ff, 7, 308, 318, 332
 Pd(II) complex 43ff, 54ff
 PEDOT 126
 penicillamine 76, 78
 PEO 173f
 peptide 147f, 176, 256, 265ff
 – homochiral 265
 phenylalanine 174, 206
 phase diagram 318f, 323, 331ff
 phosphine 53, 56, 72

- photobistable 351
 photochromic 151f, 351f, 357ff, 384
 photoisomerization 160, 350f, 357ff, 368,
 371ff, 375
 photon 11
 – circularly polarized 11, 19
 photonics 81, 83
 photoresponsive group 153, 157, 354f, 366
 physisorption 221
 π -stacking 118, 120f, 284
 π - π interaction 103, 105, 110, 132, 142f, 310,
 321, 396
 pinanediol 47, 49
 pitch compensation 278
 plane groups 217f, 248f
 planochirality 18
 polarization power 280
 poly glutamic acid 169f
 poly-(*o*-toluidine) 143
 polyacetylene 124ff, 128f, 131f, 137ff, 158f,
 176, 178
 polyaniline 127f, 137, 141
 polybithiophene 127
 polycarbazole 135f
 polycarbosilane 168
 polyester 151
 poly(meth)acrylamide 123
 – gel electrophoresis (PAGE) 70, 74, 76
 polyisocyanate 6, 22, 116, 143, 150f, 158
 polyisocyanides 123, 129, 137, 176ff
 polyisocyanodipeptide 165
 polylactic acid (PLLA) 162
 polymeric network 71, 121f
 polymerization 116f
 – electrochemical 126f
 – living 131
 – photo- 121, 128
 – ring-opening metathesis 120, 164
 – topochemical 119
 polymers 6, 152, 351, 383
 – chiral 115ff
 – dendronized 134, 138
 – imprinted 174
 – nonchiral 137f
 – polyvinyl 141
 – surfactant soluble 72
 polymethacrylate 134, 173
 polymorphism 228, 312, 332, 334
 polypeptides 4f, 142, 176, 178
 polyphenylisocyanide 130, 141
 polyphenylacetylene 131ff, 138ff, 143, 156,
 173
 polypropargylamide 133
 polypropiolic ester 155
 polypyrrole 126
 polysaccharide 169, 175
 polysilane 123, 136, 146f, 157
 polysorbate 118
 polystyrene 134, 162ff
 polythiophene 134ff, 142, 147, 149
 polythiophene-phenylene 125
 (poly)ureidophthalimide 179
 polyvinylpyridine 137
 porous oxides 397f
 porphyrin 43, 53f, 97, 100ff, 169ff, 199f, 226f,
 355
 position vector \mathbf{r} 10
 preferential crystallization 327, 329f
 preorganization 33
 prochiral 195, 196, 234f, 361
 protein 4f, 20, 115
 pseudoracemate 232, 306, 373
 PVED, *see* parity-violating energy difference
 pyrene 103, 365f
 pyridyl ligands 44f, 395
 pyridine-Pd (II) assemblies 54f
- q**
- quantity
 – scalar 10
 – pseudoscalar 10, 14, 20ff
 – vector 10
 quantum size effects (QSE) 68ff
- r**
- racemic compound 248, 306, 310ff, 325ff
 racemic hosts 49, 52, 55
 radiation, circularly polarized 128, 158
 Raman optical activity 23
 refracting media 1
 relativity 16
 resolution 294, 317
 – CPL-induced 282ff
 – electric-field driven 279, 297
 – self- 393
 resolution by entrainment 327
 resolving agent 317, 331
 ROA, *see* Raman optical activity
 rosette 37, 46, 225
 rotaxane 356
 Ru(II) complex 55, 310, 320
 rubrene 198
 rule of reversal 337
- s**
- saccharide 149
 scanning tunnelling microscopy (STM)
 192ff, 196ff, 205ff, 215f, 220ff

- schizophyllan 149
 second-harmonic generation CD 254, 293
 sergeants-and-soldiers 6, 17, 116, 121, 284,
 294
 self-assembled monolayers 215, 224
 self-assembly 37f, 44, 67, 93, 206ff, 263, 363,
 372
 SEM 122, 124ff, 167
 sensing, chiral 56ff, 138, 143
 separation 391ff
 silica 400ff
 smectic phase 273, 276, 287ff
 – blue 274ff
 sodium chlorate (NaClO_3) 16f
 softball 39ff, 47ff
 solid solution 324ff
 solvent (effect) 41, 230, 312, 328, 333ff
 space-filler concept 318
 space groups 217, 306ff
 spectroscopy 21
 spin coating 146f
 spinning cone 11f
 spontaneous polarization, P_s 276ff, 288ff
 spontaneous resolution 1f, 7, 16, 231, 313ff,
 393
 spontaneous segregation 248
 stereogenic center 80
 stereorecognition 40
 stereoselective epoxidation 404
 steric factors 100, 133f, 339
 steroid derivatives 93, 96
 steroid–steroid stacking 96f
 stilbene 97, 102f
 STM, *see* scanning tunnelling microscopy
 stochastic asymmetric transformation 254ff
 styrene 403ff
 sugars 109f
 supramolecular stereochemistry 22, 29f, 33,
 61, 203
 supramolecular host 46, 50ff
 surface chirality 192, 217f
 surface energy 69
 surface plasmon 68ff
 surface-substrate interaction 191, 235
 surfactant-templated synthesis 400ff
 switching 208, 349ff
 – antiferroelectric 276ff, 289ff
 – antipolar, *see* antiferroelectric switching
 – bistable 278
 – ferroelectric 276ff, 289ff, 295
 – of superstructural chirality 291
 – synpolar, *see* ferroelectric switching
 – tristable 278, 289
 symmetry 8f, 16, 191f, 217, 305
 – chiral 8f, 16
 – crystal 305ff
 – inversion 9f
 – monolayer 217ff
 – operations 9ff
 – spatial 8
 symmetry breaking 16f, 234, 295, 312f
 symmetry violation 13, 16f
 – nonconservation 16
- t**
- T violation 15
 tailor-made additives 319
 tartaric acid 48, 193, 200ff
 Tellegen media 13f
 TEM 96, 105, 108f, 119, 121, 128, 167
 tennis ball 39
 template 43, 169ff
 – chiral 126f, 169
 tetrathiafulvalene 178, 366f
 time reversal, T 9ff, 15
 thermodynamic
 – considerations 46, 235, 305, 322f
 – factors 21, 307
 thiol 72
 thiophene 166f
 tilt chirality 338f
 – anticlinic 289f
 – synclinic 289f
 transfer of chirality 194, 198
 triazine triamides 119
 TRISPHAT 320ff
 twist grain-boundary phase (TGB) 276
 2D chirality 17, 196
 2D film 247ff
 2D monolayers to 3D crystal 263ff
 – α -glycine 264ff
 – self-assembly 263
 – orientated 3D crystallization 263
 two-dimensional systems 17f, 196ff
 true and false chirality 3, 7, 10, 12f, 18ff
- u**
- unidirectional rotation 374f
 unit-cell vector 219f
- v**
- van der Waals 33, 96, 220, 225, 237, 318
 VCD, *see* vibrational circular dichroism
 vector
 – axial 10
 – polar 10
 – propagation, k 13
 – pseudo 10

– true 10
vesicles 165ff
vibrational circular dichroism 23
virus 23
– capsid 8ff
– filamentous bacterial 20
vortex motion 19

w

water
– chiral monolayer 247ff
waveguide 85
weak interactions 4, 29, 31

– weak natural current 14
Weigert effect 281ff

x

X-ray diffraction 105, 131f, 134
– grazing-incidence 249

y**z**

zeolites 392f, 397f, 405
Ziegler-Natta catalyst 116
Zn-porphyrin 53f