

Index

a

- acetic acid 322, 447
 - acetonitrile 451
 - acetylcholine 67
 - acetylcholin esterase 205
 - acetylthiocholine 204
 - actin 185
 - cytoskeleton 53
 - filaments 185, 187
 - action potential 67
 - activatin barrier 406
 - acylisourea intermediate 451
 - adenine 256
 - adenovirus 55
 - adhesion peptides 36
 - adhesion peptides 41
 - adocia-sulfate-2 191
 - affinity-contact printing 32, 34, 44
 - Affymetrix 26
 - AFM 38, 42, 48, 218, 231, 261, 264, 251, 331, 387, 404, 409f, 413, 415, 418ff
 - cryo 390
 - probe 396
 - tip 396
 - tip radius 396
 - algal cells 127
 - alignate/PLL particles 333
 - alkaline deacetylation 321
 - alkaline phosphatase 228
 - alkoxysilanes 449
 - aluminium
 - anodizing of 5
 - aminoalkylsilanes 335
 - γ -aminobutyric acid (GABA) 67
 - aminopolysaccharide 321
 - aminopropyltriethoxysilane (APTES) 278
 - ammonium hydroxide 446
 - amphiphilic dendrimers 170
 - anion pump 149
 - anodic stripping voltammetry 206
 - antibiotics susceptibility 16
 - antibody 229, 235f, 310, 405, 421, 452
 - anticancer drugs 415, 424
 - antigenic site 421
 - antisense oligonucleotides 333
 - antisense therapy 320
 - apo-enzymes 203
 - apo-ferritin 279, 282
 - apo-flavoenzyme 203
 - apo-glucose dehydrogenase 203
 - apo-glucose oxidase 203
 - argon ion etching 88
 - array spotters 14
 - artificial intelligence 73
 - artificial retinas 158
 - artificial cells 177
 - ascorbic acid 203
 - asialoglycoprotein 333
 - atomic force microscopy
 - see* AFM
 - ATP 186, 191
 - energy 186
 - photoactivatable 191
 - synthase 186, 196
 - use 156
 - autocatalytic process 267
 - autometallography 354, 371
 - avidin 201, 206, 451
 - avidin-biotin pair 451; *see also* „streptavidin“
 - conjugation protocol 454
 - linkage 453
- ### b
- Bacillus sphaericus* 78f
 - backplane 46
 - bacteriophage portal motor 416
 - bacteriorhodopsin 146ff, 150ff, 177, 196, 390, 392
 - genetic modification 153
 - M-intermediate 152
 - M-state 160

- photochromic 155
 - photochromic applications 159
 - photocycle 152
 - photoelectric applications 156
 - photoelectric properties 157
 - properties 155
 - barcodes
 - biological 299
 - barcoding 349
 - β -barrel 93f
 - Berenil 390
 - beta-galactosidase 228
 - beta-galactosidase gene 329
 - bifunctional methoxy molecules 347
 - bifunctional peptide 122
 - bilayers 97, 103, 106
 - bilayer lipid membranes (BLMS) 86
 - binding potential 404
 - biocompatible devices 1ff
 - biocomposites 126
 - biodegradability 171
 - bioelectronics 200ff
 - biofuel 201
 - biogenic nanoparticles:
 - see microbial nanoparticle production 133
 - biohydrometallurgy 147
 - biokleptic 317
 - bioleaching 147
 - biological sensors 14
 - biomembrane force probe 404, 408, 419, 423
 - bioMEMS 26
 - biometallic aggregate 235
 - biomimetic chemistry 256
 - biomolecular motors 185f, 189, 191ff
 - connecting to cargoes 194
 - directionality 189
 - efficiency 186
 - electrical polarization 194
 - fixation 194
 - force 189
 - guiding 192
 - spatial control 189, 192
 - speed 189
 - stereospecific binding 193
 - temporal control 189, 191
 - biomolecular templates 261
 - biopolymers 257, 409, 418
 - biosensing 202
 - biosensors 49, 73, 84, 103, 169
 - for *E. coli* 169
 - nanopores 103
 - biotemplates
 - filamentous 278
 - bioterrorism 452
 - biotin 48, 194, 231ff, 259f, 451
 - labeling 252
 - biotin-functionalized nanoparticles 217
 - biotin-streptavidin pairs 408
 - biotinylated DNA gold 259f
 - biotinylated DNA 231
 - biotinylated ferritin 81
 - biotinylated protein 348
 - block copolymers 103, 122, 172
 - cationic 336
 - nanocontainers 174
 - pluronic 336
 - protein hybrid systems 175
 - blood plasma 172
 - bloodstream 3
 - B16-melanocytes 61
 - Boehmite 5
 - bond dissociation 408
 - bond rupture force 407f
 - borofloat 19
 - borosilicate 129
 - borromean rings 311
 - bottom.up 27, 185, 179, 215, 257, 228
 - bovine serum albumin 35, 43, 47, 348
 - brochoalveolar lavage 333
 - bronze alloy 195
 - Brownian dynamics 109
- C**
- calmodulin 192
 - Campylobacter fetus 80
 - cancer genes 453
 - cancer therapy
 - ^{125}I 8
 - ^{103}Pd 8
 - Candida glabrata 130
 - cantilever 21, 396, (see also AFM)
 - capillary electrophoresis 16, 21
 - capillary fluid transport
 - actively driven 17
 - fluidic transport 17ff
 - capillary forces 15
 - capture antibody 33
 - carbodiimide hydrochloride 450f
 - carbon nanotubes 106
 - carboxylic acid 348
 - cardiology 2, 8
 - cathepsin 101
 - catheter 2
 - cationic copolymers 338
 - cationic phospholipids 320
 - cationic polymers 320
 - cationic segment 336
 - CdS-nanoparticle 205

- cell 61, 66
 - labeling 452
 - migrating 61
 - patterning 66
 - quiescent 61
 - cell adhesion 53, 56ff, 404ff
 - apoptosis 53
 - differentiation 53
 - proliferation 53
 - cell adhesion molecules 34, 41
 - cell-cell adhesion 53
 - cell layers 409
 - cell membrane
 - adhesion 409
 - cell-surface display 113, 115
 - cell-surface layers 77
 - cell wall polymers 80
 - cellular dipole moment 138
 - cellulose 321
 - cermet 128
 - chalcogenide 344
 - chaperonins 196, 278
 - chemical decomposition
 - photo-induced 346
 - chemical force microscopy
 - chemisorption 35
 - chip surface functionalization 304
 - chiral phospholipids 278
 - chitin 321
 - chitin-binding domain 230
 - chitoplexes
 - transfection efficiency 327
 - chitosan 321, 389
 - deoxycholic acid modified 325
 - depolymerized oligomers 322
 - trimethylated (TMO) 327
 - chloride pump 148
 - chlorophyll 148
 - chloroquine 324, 332, 335
 - cholesterol 174, 329
 - chromatophores 155
 - chromosomes 185
 - chronopotentiometric stripping 206
 - chronopotentiometry 207ff
 - cisplatin 263, 390
 - cluster nucleation 270
 - co-deposition 203
 - collagen 56
 - colocalization 350
 - combinatorial chemistry 22
 - competitive IPCR 233
 - concanavalin A 201
 - conductive polymers 27
 - confocal microscopy 331
 - conformal contact 31f, 36, 48
 - consensus sequences 120
 - contact angle 24, 32
 - contact angle microscopy 48
 - contact processing 33
 - copolymer 58
 - core-streptavidin 82
 - cortical neurons 72
 - cos-1 cells 336
 - cowpea chlorotic mottle virus (CCMV) 279
 - critical aggregation concentration 173
 - cross-linked knedels 173
 - crosslinker 44, 47, 234, 238
 - heterobispecific 234
 - heterobispecificity 238
 - cryo-AFM 390
 - crystals 147, 154
 - two-dimensional 147, 154
 - cuboctahedral 140
 - current-voltage curves 109
 - CVD 24
 - cyanogen bromide 451
 - cyclic peptides 60, 98, 100
 - cyclic RDG molecules 60
 - layers 95
 - cycloaddition 220
 - $2 \cdot + 2 \cdot$ 220
 - cyclodextrins 96
 - cytochrome c 35
 - cytomegalovirus 206
 - cytosine 256, 308
 - cytoskeleton 70
 - cytotoxicity 333
- d**
- Darwinian process 116
 - degradation 319
 - dendrimers 169
 - Desulfovibrio* 136
 - DETA 71
 - detection
 - bacteria 452
 - DNA by colorimetric assay 289
 - sub-picomolar range 454
 - using DNA gold nanoprobe 295
 - detoxification 126
 - diamond-like carbon 3, 4
 - diaphragm 22
 - diatoms 126
 - dielectrophoresis 16
 - differential interference contrast 53
 - diffusion 412
 - dimethyl cadmium 344
 - dimethylaminoborane 219, 263

- dimethylsulfoxide 347
 - dip-pen nanolithography 58, 195, 237, 395
 - dipstick-immunoassays 84
 - display methods 115
 - dissociation rate 407
 - disulfide linkage 239, 451
 - dithiothreitol (DTT) 347
 - three-dimensional memories 159
 - DMRIE 329
 - DNA 221, 229, 240, 404
 - analysis 453
 - bases 256
 - binding protein 424
 - charge transport 229
 - complementary strands 408
 - condensation 388, 415
 - conductivity 245, 395
 - directed immobilization (DDI) 236
 - enzyme conjugates 228
 - hairpin loops 240
 - hapten conjugates 232
 - heterogeneous detection 292
 - homogeneous detection 292
 - junctions 246, 249
 - mapping 388
 - mechanics 414
 - metallization 249, 251
 - nanoparticle conjugate 211, 288, 292
 - nanorobotics 317
 - nanowires 370
 - networks 261
 - parallelograms 311
 - plasmids 319
 - polyanionic 336
 - polycation condensed 330
 - polymerase 196, 391
 - polymerization 416
 - protein interaction 416, 421
 - protein structures 218
 - protein-nanostructures 227ff.
 - replication 423
 - /RNA molecules 453
 - scaffolds 246, 249
 - secondary structures 240
 - sphingosine 331
 - streptavidin conjugates 230ff
 - streptavidin nanocircles 232
 - substrates 245, 252
 - DNA-templated assembly 246, 248
 - templated electronics 245ff, 252
 - transcription 423
 - transistor 221
 - tripods 261
 - unzipping forces 422
 - wires 261
 - DNase I 391
 - DOPE 327
 - DOTMA 327
 - DPN *see also* dip-pen nanolithography 58
 - Drude model 271
 - drug
 - anti-proliferative 7
 - carrier 2
 - delivery 169
 - local delivery 6
 - nanoporous alumina 6
 - restenosis 7
 - three-dimensional storage 163
 - dynamic force spectroscopy 405
 - dynein 185
- e**
- E. coli* 104, 245, 249, 251, 452
 - E. coli* Rec A protein 245, 249, 251
 - ECM proteins 68, 72
 - EDX 9
 - electrical communication 202
 - electrochemical indicators 209
 - electrochemiluminescence 200
 - electrochromic ink 162
 - electrode arrays
 - microfabricated 261
 - electrodifusion theory 109
 - electroless deposition 49, 202
 - electron beam lithography 68, 192
 - electron mediators 202
 - electron transfer turnover rate 203
 - electron-beam lithography 38
 - electronic conduction 245
 - electroosmotic flow 20
 - electrophoretic mobility 332
 - electroplating 23
 - electrostatic binding 348
 - ELISA 229, 233, 239
 - ellipsometry 48
 - emulsion solvent evaporation 334
 - encapsulated translation
 - in polymer nanocontainers 177
 - encapsulation 170, 181
 - in liposomes 181
 - endocytosis 181, 320, 349, 351
 - endolysosomal membrane 334
 - endonucleases 196, 201
 - endosomolysis 332, 324
 - endosomal escape 320
 - endothelial barrier 181
 - endothelial cells 84, 334
 - endothelial fenestration 338

endothelial growth factor (EGF) 338
 energy conversion 163
 enrichment cycle 114
 enzyme metallography 369
 ephemeral branch points 310
 epithelial cell 324, 327
 ethidium bromide 332, 390
 ethyl ammonium bromide 329
 ethylene diamine 25
 excitatory neurotransmitters 67
 excitonic fluorescence 345
 exoskeleton 322
 extremophilic actinomycetes 127
 extremophilic bacteria 196

f

F₁-ATPase 190
 Fab-chains 201
 FAD monolayer 203
 Fan-out 162
 far-red 349
 fast-atom beam milling 88
 fermentation 16
 ferritin 279
 ferrofluids 130
 fibroblast growth factor (FGF) 338
 fibroblasts 68
 fibronectin 35, 41, 56
 field-effect-transistors 200
 filament-binding protein 194
 filaments 185
 FISH 362
 FITC 43f
 flagella 136
 flagellar motor 150, 196
 flexible polymers 412
 flocculation 347
 fluorescence microscopy 49, 248
 flow sensors 14
 fluidic mixing elements 14
 fluorescein 346
 fluorescein-dextran 447
 fluorescence activated cell sorting (FACS)
 114
 fluorescence emission spectra 343
 fluorescent cells 452
 fluorescent gold labeling 357
 fluorescent labels 343
 fluorescent materials 452
 fluorescent microspheres 190
 fluorinated silanes 36
 5-fluorocytosine 228
 focal contact 60ff
 folate 338

folic acid 350
 force spectroscopy 411, 415ff
 force-induced dissociation 408
 formaldehyde dehydrogenase 204
 fossils 394
 Fourier transform infrared (FTIR) 391
 FRET 314
 functional assemblies 424
 fungal cell wall 322
Fusarium oxysporum 131
 fusogenic peptides 332
 FUTORAN 20

g

G₄S linker 123
 gain-of-function mutants 120
 galactose 338
 β -galactosidase 122, 154
 ganglion 68
 ganglion neurons 68
 gap junction 67, 97
 gelelectrophoresis 240
 gelsolin 194
 gene delivery 320
 – chitosan-mediated 324
 – intranasal 324
 – *in vivo* 338
 – nonviral 330
 – nonviral nanoparticle 339
 gene insertion 338
 gene therapy 177, 180, 320, 336ff
 gene transfer
 – *in vivo* 331
 gene vectors
 – transferrin-modified 333
 genetic controls 409
 genetic screening 195
 genomagnetic nanocapturers (GMNCs) 453
 genomics 256
Geobacillus stearothermophilus 78, 80
 geomagnetic field 139, 143
 giant amphiphile 175
 glass microneedles 404, 415
 gliding assay 186, 188
 gliding microtubules 189
 GLP (good laboratory practice) 239
 glucose oxidase 35, 203
 glutamine 67
 glutaraldehyde 48, 249, 451
 glutathiones 130
 glycerol 336
 glycine 67
 glycoprotein 77
 GMNC 453

gold
 – thiol interaction 248
 – clusters 235
 – enhancer 357
 – fish 361
 – nanoparticles 213, 237
 – nanotubes 96, 98
 – staining 355
 – substrates 35
 – surface 37
 G-protein 237
 graft copolymers 336
 grafting 24
 gramicidin 95, 99, 172
 green fluorescent protein 190
 Greengold 369
 greigite 137, 140
 GroEL 398
 guanidine hydrochloride 82
 guanine 256, 308
 Gyrolab™ microlaboratory 17

h

halobacteria 147
Halobacterium salinarum 150, 392
Haloferax volcanii 153
 halophilic bacteria 195
 halophytes 153
 – antibiotics against 153
 halorhodopsin 148, 150
 Hamiltonian path problem 315
 heaters 20
 HEK293 cells 324
 helix bundle 93f
 helix coil transition 175
 helper-oligonucleotides 240
 α -hemolysin 86, 94ff
 heterobifunctional crosslinker 71
 heterocyclic ligands 268
 heterogeneous immunoassay 35
 hexahistidine tag 194, 367
 hexamethyldisilazane 24
 hinge peptide 122
 hip joints 1
 histidine 270
 his-tag *see* hexahistidine tag
 Holliday junction 310
 hollow capsules 171ff
 hollow sphere 174
 holography 163ff
 HOP* 397
 horseradish peroxidase 228
H. salinarum 153
 hybridization efficiency 240

hydrodynamic flow 260
 hydrogel 33, 47
 hydrolysis 266, 451
 hydroquinone 210, 219, 247ff
 hyperplasia 4, 6
 hyperpolarization 67

i

¹²⁵I 9
 imaging in liquid 395
 immunoassay 42, 228
 immunofluorescence 350
 immunoglobulin G (IgG) 35, 390
 immunoglobulin M (IgM) 390
 immunogold staining 354
 immuno-PCR 229ff
 – competitive 229
 immunosensor 209
 implant 1
 in situ hybridization
 – gold/silver-based 361
 in situ PCR
 – with gold 361
 indomethacin 170
 inflammatory responses 4
 infrared 349
 inhibitory neurotransmitters 67
 incjet printhead 14
 insert analysis 118
 insulin 178
 integrin 53ff, 55
 intercalator 219, 313
 inter-device wiring 246
 interfacial molecular recognition 260
 interferometry 163
 interleukin 8 84
 intermolecular interactions 419
 intratracheal instillation 333
 ion channels 99
 ion sculpting 95
 ionophore 176
 IPCR 231, 239
 iridium 375
 ISFET 200
 ISO standards 10
 isopycnic gradient centrifugation 155

k

kinesin 185
Klebsiella aerogenes 129
 Klenow fragment 213
 KNOB protein 324
 knock-out mutants 143

I

LabCD 17
 Lab-on-a Chip 13ff, 23, 26, 85
 β -lactamase 176
Lactobacillus 80, 128
 lactose 338
 lambda phage 176
 laminar flow 14, 22, 46
 laminin 35f, 41, 68, 71, 73
 Langevin function 139
 Langmuir-Blodgett technique 24, 86, 89, 156
 laser tweezers 415
 latex particles 209
 lattice symmetry 79
 layer-by-layer deposition 170ff, 213
 layer-by-layer hybridization 211
 lectin 80
 leukemia 452
 leukocidin 95
 ligand 404
 ligand molecule 405
 ligand-gated channels 181
 ligand-receptor interactions 409, 420ff
 light scattering 290
 – by gold nanoparticles 294
 linear motors 186
 lipid bilayers 168
 lipid chips 85
 lipid membrane 85, 87
 – lateral diffusion 87
 lipids
 – gold labeled 365
 lipofectamine 324
 lipoplex 327, 331
 liposomes 89, 168ff, 181, 365
 – biotinylated 297
 – blood clearance 181
 – cationic 327
 – sphingosine based 331
 liquid crystal 159
 lithography 23, 67, 249, 252
 Living Chip™ technology 15
 localized surface plasmon resonance (LSPR) 430f
 Lotus effect 27
 low density lipoprotein (LDL) 338
 luciferase 234, 325
 Lugols iodine 359
 lumen 96
 luminescence 350
 lyophilization 336
 lyoprotective agents 336
 lyotropic mesophases 172
 lysine phosphate 332
 lysoomolytic 324

lysosomal enzymes 320

lysosomal escape 336

lysozyme 82

m

M13 phage 114, 123, 213,
 macroinitiator 336
 magnetic bacteria 139
 – flagella 139
 magnetic beads 207, 404, 417, 422
 magnetic force microscopy 395
 magnetic particles 206, 422
 magnetic resonance imaging 343
 magnetic separation 207, 453
 magnetic triggering 206
 magnetic tweezers 415, 419, 422
 magnetite 137, 140, 141
 magneto-controlled amplified detection 206
 magnetocrystalline 281
 magnetoreceptor 395
 magnetosome 136ff, 140ff
 – gene expression 141
 – greigite crystals 141
 – membrane 137, 142
Magnetospirillum 136ff
 magnetotactic bacteria 126, 136ff
 magnetotaxis 136ff
 mannose 338
 mass transport 47
 master tool 23
 MC3T3 cells 10, 60, 62
 mecaptoacetic acid 347
 melamine 171
 melting transition 289, 292
 membrane 97
 membrane array 107
 membrane protein 151, 175, 393
 membrane-bound process 409
 MEMS *see* Micro Electro Mechanical Systems
 mercaptopropyl-trimethoxysilane 347
 mercaptopurine 178
 Merlin Diagnostika 16
 metallosomes 365 ff
 methanol 347
 methoxysilyl-propyldiethylenetriamine
 (DETA) 450
 methyltransferase 228ff
 Mevinolin 153
 mica 397
 micellar lithography 59
 – block copolymers 59
 micelles 58f, 349
 Micro Electro Mechanical Systems 14ff, 70
 Micro Total Analysis Systems (μ TAS) 16

- microarrays 56, 58, 100, 211, 236
 - DNA 13, 24, 56, 211, 236, 389
 - protein 13, 24, 31, 42, 58, 100, 236
 - microfluid devices 31
 - microbeads 423
 - microbial nanoparticle production 126ff
 - Au/Ag alloy particle 128
 - CdS for 129, 130
 - CdS particles through CdSO₄ reduction 131
 - gold nanoparticles 131
 - magnetite 130
 - silver particles 127
 - microcapillary 47
 - microcarriers 90
 - microchannels 21, 44
 - microcontact printing (μCP) 31ff, 71
 - microcontainers 47
 - microelectrode array 68
 - microemulsion 445
 - microfabrication 13ff
 - microfluidic devices 13ff
 - reaction chambers 21
 - array 70
 - stacking 18
 - sealing 18
 - microfluidic network (μFN) 33
 - microgravimetry 213, 215
 - micromachining 19
 - “micro”-nanostructures 63
 - microneedles 417, 419, 421
 - micropipette 107, 423
 - micropumps 14
 - microscopy 53
 - microspectrophotometers 26
 - microsystem technology 14
 - microtubule 185ff 267
 - microvalves 14
 - minerals 126
 - mitochondria 185
 - mold 46, 71
 - molecular beacon 202, 453
 - gold-quenched 372
 - molecular chaperones 398
 - molecular diffusion 422
 - molecular dynamics simulation 109, 413
 - molecular dynamics
 - first principle MD 267
 - molecular electronics 244
 - DNA-templated 245ff, 252
 - molecular engineering 244
 - molecular force spectroscopy 414
 - molecular imprinting 27
 - molecular memory 398
 - molecular motor 181, 185ff, 417f, 421, 424
 - actin-based motors 185ff, 417
 - flagellar rotatory motor 185ff, 417
 - kinesin motors 185ff, 417
 - molecular pulling 390f
 - molecular robots 186
 - molecular rotors 404
 - molecular switches 424
 - molecular synapse 313
 - molecular variation 398
 - monolayer 203
 - mononuclear lymphoid cells 452
 - motility assay 186, 191
 - motor proteins: *see* biomolecular motors
 - MPTS 451
 - mRNA display 115
 - multienzymes 234, 241
 - multifunctional protein assemblies 234
 - multivalent cations 415
 - myocardial infarction 2, 84
 - myosin 53, 185, 194
- n**
- nanocapsule 321
 - nanocircuitry 215, 313
 - nanocomplexes 322
 - nanodroplets 445
 - nanoelectronic applications 261
 - nanofabrication 454
 - nanofactory arrays 181
 - Nanogen 26
 - nanogold 353
 - fluorescent 359
 - nanolithography 237
 - nanomachine 123, 181, 227
 - nanomagnets 282
 - nanometer-scale epitope 409
 - nanonewton forces 413
 - nanoparticle superlattices 88
 - nanoparticles 200ff, 289
 - aggregation 430
 - biogenic synthesis 126ff
 - CD-10 452
 - CNBr-treated 452
 - colloidal gold 291
 - development of 452
 - DNA
 - DNA-functionalized 201ff, 237ff, 291, 299
 - dye-doped 444
 - enzyme hybrids 202
 - gold, synthesis 301f
 - iron oxide 449
 - magnetic silica 444ff
 - metal 289, 444
 - palladium 373

- pharmaceutical 321
- platinum 264, 372
- Raman fingerprints 297
- silica-based 454
- solid lipid (SLN) 332
- table 290
- TMR-doped 454
- zwitterionic 336
- nanoplex 335
- nanopores 93ff
- nanoporous alumina 4ff
- nanoprobe 252, 452
- nanopropellers 190
- nanoreactor 108, 445, 447
- nanoscopic machines 424
- nanosensors 446
- nanotiterplates 15, 22, 25
- nanotransistor 222
- nanotubes
 - as AFM probes 397
- native chemical ligation 239
- near infrared 349
- nebulization 333
- neural networks 162
- neurocomputers 74
- neuroelectronic circuits 66
- neurological implants 66
- neuromancer 73
- neuronal cell patterning 66
- neuronal networks 66, 74
- neuronal prostheses 73
- neuron-glia cell adhesion 41, 46
- neurons 66ff, 69, 200
- neurotransmitter 67
- NgCAM 45
- N-hydroxysuccinimide 451
- NIH-3T3 cells 230
- Ni-NTA 367f
- nitinol® 3
- nitriloamine 194
- novelty filtering 158
- Novobiocin 153
- nucleoprotein filament 249, 251
- nucleosomes 416

O

- O₂ plasma 24
- O-acylisourea 450
- OCN groups 451
- octadecyltrichlorosilane 24
- olfactory lamellae 395
- oligonucleotides 246
 - disulfide-derivatized 247
 - synthesis 261

- oligospecific antibody constructs 236
- OmpF channel protein 175
- OmpG 107
- oncology 8
- ophthalmic delivery 321
- optical storage 164
- optical trapping interferometer 416
- optical traps 417
- optical tweezers 190, 404, 409, 419ff
- organometallic complexes 270
- osteoblasts 60ff
- Ostwald ripening 344
- oxidoreductase 234

P

- PAH 24
- palladium 271
- PAMAM starburst dendrimers 241
- parallel inking 44
- paranemic crossover molecule 310
- paratungstate 279
- particle probes 447
- particles
 - carboxy-modified 450
- patch-clamp 72
- paxillin 53
- PC 20
- PCR 16, 116, 118, 229, 239, 258
 - immuno (*see* IPCR)
 - real time 239
- PDMS 21, 31ff, 34, 39, 70f, 107, 174, 189, 217
- PEEK 20
- PEG *see also* poly(ethylene glycol) 36, 56, 99, 100, 324
- PEG-beta-PEI 336
- PEG-beta-PLL 336
- PEI 24
 - polyplexes 324
- PEO 56, 174, 192
- peptide binding 119, 121, 123f
 - aluminium 119
 - amino acid sequence 121
 - biotin-acceptor 123
 - context dependence 122
 - gold 119
 - mica 119
 - polystyrene 124
 - polyvinyl chloride 124
 - silica-precipitating 121
 - silver 119
 - ZnS nanocrystals 119
- peptide nucleic acid *see*: PNA
- peptide
 - gold cluster labeled 364

- peptidoglycan 80
- peptone media 148
- peptosomes 175
- percutaneous transluminal balloon angioplasty (PTCA) 2
- phage display 113, 115
- phage M13 *see*: M13 phage
- phenyltriethoxysilane (PTES) 447
- phosphate-buffered saline (PBS) 452
- photoactivated compounds 420
- photobleaching 343, 445, 452
- photochemical patterning 70
- photochromic classifier 161
- photochromic ink 164
- photocuring 47
- photocurrent action spectra 212
- photodegradation 445
- photoelectrochemistry 200, 212
- photoexcitation 204
- photoionization 347
- photoisomerization 151
- photolithography 26, 69f, 244
- photonic force microscopy 409, 422
- photoreceptors 79, 149
- photoresist 70
- photorewriteable storage 162
- photostability 346
- photosynthesis 148, 155
- photovoltage 156
- pH-responsive dendrimers 178
- phycoerytherin 346
- physical vapour deposition 6
- piezo-driven membrane pump 17
- piezoelectric crystals 200, 213
- piezoelectric printheads 26
- piezo-electric transducer 423
- PIPAAm 179
- pLacZ 324
- plasma 58
- plasma etching 24
- plasma polymerization 24
- plasma processes 24
- plasma-etching 70
- plasmid 332
- plasmid delivery
 - *in vivo* 322
- plasmid DNA 320, 331
- plasmon absorbance 202, 205
- plasmon vibration 129
- platinum (II)
 - *in vitro* 263
- platinum
 - aquated 263
 - dimers 268
- PMMA 20, 25, 39
- PNA 231, 241
- pollenallergen 84
- poly(ethylene glycol) *see* PEG
- polyaniline 203
- polycation liposome system (PCL) 330
- polydispersity index 334
- polyelectrolytes 171, 320
- polyelectrolyte layers 171
- polyethyleimine (PEI) 324, 332f
- polyhedral catenanes 311
- polylactic acid (PLA) 334
- polylactide-co-glycolide (PLGA) 334
- polylysine 35f, 41, 332
- polymer films 161
- polymer nanocontainers 168ff
 - controlled permeability 175
- polymerase chain reaction *see* PCR
- polyornithine 68
- polyphosphate 343
- polyplexes 333
- polysaccharide 413
- polystyrene 36
- polystyrene latexes 171
- polyvinyl alcohol (PVA) 334
- POM 20
- population complexity 116f
- porin 97, 94
- postsynaptic receptors 67
- pregnancy testing 353
- prion diseases 364
- prion protein 391
- proteasomes 196
- protein A 35, 209
 - IgG bond 408
- protein domains 405, 410f
 - engineered 424
- protein engineering 104
- protein folding 409
- proteinase K 40
- proteomics 237, 256
- proton-gradient 142
- proto-Z-DNA 314
- PS 20
- Pseudomonas stutzeri* AG259 127
- PSS 24
- puromycin 230
- purple membrane (PM) 154f, 157
- PVD 24
- pyranosyl-RNA 237, 241
- pyrene 178
- Pyrex 7740 19
- Pyrolobus fumarii* 147
- pyrroloquinoline quinone 203

q

quantum dot 172, 202, 343
 quartz crystal microbalance (QCM) 212, 237

r

radialarians 126
 Raman spectroscopy 129, 297
 rapid prototyping 46
 RecA 221
 λ -receptor 115
 receptor-functionalized surface 409
 receptor-ligand interactions 405, 408
 recombinases 196
 redox-active polymers 202
 redox-enzymes 202
 redox-relay groups 202
 REF52-fibroblasts 61
 refractive index 430
 respiratory syncytial virus 324
 restenosis 4
 reticuloendothelial system (RES) 319
 retinal 148f, 151
 – all-*trans* 149
 – 13-*cis* 149
 tetraethoxysilane (TEOS) 278
 RGD 54ff, 57, 68
 rhabidosomes 279
 rhodamine 6G 343, 447
 rhodopsin 392f
 ribosome 115, 196, 227, 230
 ribozyme 398
 RNA 279, 415
 – detection assays 292
 – polymerases 196, 391
 rotary motors 186

s

sacrificial electron donor 212
 SAM 56, 70ff
 sandwich immunoassay 349
 Sauerbrey equation 213
 scanning force microscopy (SFM) *see* AFM
Schizosaccharomyces pombe 130f
 science-fiction 73
 seeds 1, 7ff
 selenium 344
 self-assembled monolayer *see* SAM
 SEM 251
 semiconductor nanoparticles *see* quantum dot 202
 semiconductor 245
 serotonin 67
 SERS 430, 434
 – cytochrome 434f

– DNA detection 437f
 serum nucleases 319
 signal transduction 72
 silanes 34, 398
 silica 444ff
 – carboxy-modified 451
 – monoliths 278
 – RUBpy-doped 452
 silicon 19
 silicon carbide 3
 silver developing 292
 silver nanowires 9
 single base mismatch 214
 single bond rupture 407
 single molecular device 419
 single molecule force microscopy 404, 412
 single-chain antibody 230
 single-channel recording 105
 single-domain particles 130, 138
 single-molecule force clamp 420
 single-molecule force spectroscopy 420, 424
 skeletal muscle 338
 S-layers 77, 80, 83, 85, 123, 126, 216
 – fusion proteins 85
 – homology (SLH) motifs 80
 – recrystallization 83
 SMC *see* smooth muscle cells
 smooth muscle cells 3, 8
 sodium borohydride 219
 soft lithography 31
 solution casting 24
 sonication 322
 spark erosion 23
 spatial light modulators 159
 spermiogenesis 363
 sphalerite 141
 spheroblast 153
 spider silk 393f
 spin coating 24
 spinel structure 140
 spliceosomes 196
 spotters 25
 SPR *see* surface plasmon resonance
 sSMPB 234f
 stamp 31ff, 46ff
 – cylindrical 48
 – surface chemistry 47
 – three-dimensional 43
Staphylococcus 104
Staphylococcus nuclease 228
 starburst dendrimers 169
 steady-state photocurrent 204, 212
 STEAG microParts 16
 'stealth' liposomes 169

- stents 1f
 - stepping assay 188, 190
 - stereochemistry 100
 - stimuli-responsive nanocapsules 178
 - stochastic sensing 101, 105
 - stop codon 120
 - streptavidin 35, 81f, 123, 194, 214, 216, 231ff, 259
 - streptolysin O 102
 - stress fibers 61
 - stripping potentiogram 210
 - stripping response 208
 - stripping voltammetry 210
 - succinic anhydride 450
 - suicide vectors 154
 - sulfo SMPB 238
 - superconductivity 245
 - superhydrophobicity 27
 - superparamagnetic 138, 280
 - supramolecular chemistry 256
 - surface biology 387
 - surface enhanced Raman spectroscopy *see* SERS
 - surface plasmon resonance (SPR) 85, 237, 291, 429
 - amplification 432
 - BIAcore instrument 431
 - DNA detection 433
 - localized 430f
 - substrates 439
 - surface roughness
 - aspect ratio 21
 - SWISS-PROT data base 121
 - Sylgard 184 34, 38f, 46
 - synapse 67
- t**
- μTAS *see also* micro Total Analysis Systems 16, 18
 - tecto-RNA 310
 - 3T3-fibroblasts 61
 - TEM 264
 - tetrachloroplatinate 263
 - tetramethylrhodamine 447
 - dextran complex 447
 - Thermoanaerobacter ethanolicus* 130
 - thermoresponsive micelles 179
 - thiocholine 204
 - thioglycerol 343
 - titin 394, 410
 - tobacco mosaic virus (TMV) 278
 - top-down 27
 - topoisomerases 196
 - transfection efficiency 324
 - transfectivity 334
 - transferrin 324, 333, 338, 350
 - transgene expression 324
 - translational enhancer element 324
 - translocases 196
 - transmembrane potential 67, 177
 - transmembrane proteins 93
 - trapping interferometer 422
 - trehalose 101, 336
 - tricosadiynoic acid 169
 - TRITC 35, 43f
 - truncated octahedron 236
 - tubulin 278
 - tungstate 279, 374
 - turbostratic carbon 4
 - turbulence 14
- u**
- ultrafiltration membranes 84, 90
 - unbinding process 406
 - undecagold 353
 - unimolecular micelles 170
- v**
- vaccines 90
 - valinomycin 172
 - valves 22
 - vascular diseases 2
 - vectors
 - DNA 331
 - nonviral 320, 339
 - specialized 338
 - therapeutic 339
 - universal 338
 - viral 320
 - Verticillium sp.* 131
 - vesicles 168
 - multilamellar 327
 - unilamellar 327
 - vinculin 53, 63
 - viral particles 320
 - virion cages 178
 - viroids 279
- w**
- washing stringency 297
 - Watson-Crick base pairing 258, 308
 - wettability 36f
 - wetting characteristics 24
- y**
- Young's modulus 38f, 187
- z**
- zeta potential 334
 - ZnS quantum dot 395