

Index

3DP, *see* printing

a

AAA⁺ ATPase 387

ABA polymersome 404ff.

abraxane® 276

AC, *see* alternating current

acetylcholine (ACh) 10

acetylcholine esterase (AChE) 104
– AChE/ChOx enzyme cascade 106
– Au NP 106

acetylthiocholine 104

ACh *see* acetylcholine

AChE, *see* acetylcholine esterase

actin 385

adaptive structure 39

ADDL, *see* amyloid- β -derived diffusible
ligand

adenosine triphosphate, *see* ATP

adenovirus (ADV) 53

adrenaline 101

AFM, *see* atomic-force microscopy

affinity

– biomolecular 216ff.

Ag, *see* silver

aggregate 4

– cyclic peptides 4

– ion pair 4

– sterol-polyamine 4

akaganeite 55

albumin 298

ALD, *see* atomic layer deposition

alkaline phosphatase 101

– Au NP-functionalized 114

alkanethiol

– self-assembled monolayer 356

alkyl thiol

– cantilever 180

alternating current (AC) 200

Alzheimer's disease 20, 167

amelogenin 45

8-aminonaphthalene-1,3,6-trisulfonate, *see*
ANTS

aminopropyltriethoxysilane (APTES) 53

amphotericin B 5ff.

amplification

– multiple 134

– NP-based 137

β -amyloid 20, 167

amyloid plaque 167

amyloid- β -derived diffusible ligand (ADDL)
167

amyloidosis 22

analyte headspace 184

analytical ultracentrifugation 34

angiogenesis 269, 333, 366ff.

angioplasty 373

antibody 136, 167, 180ff., 226, 237ff., 367ff.

– cantilever 180

– immobilization 71, 136, 243

– monoclonal 180

– NP 136

– NSL-fabricated NP surface 167

– single-chain fragment (scFv) 185

antigen binding rate 219

– on/off 219

antisense therapy 287

ANTS (8-aminonaphthalene-1,3,6-trisulfonate)
12

apoferritin 327

apolipoprotein 268

– A-I 26

apoptosis 334

– FRET-based apoptosis-detecting

poly(amidoamine) dendrimer 311

aptamer 136, 272ff.

– immobilization 136

– nucleic acid 272

- APTES, *see* aminopropyltriethoxysilane
- array
- cantilever 177ff.
 - sensor 176
 - two-component array of antibody 237
- array sensor 176
- cantilever 176
- artificial ion channel
- activity 10
 - blockage 10
 - self-assembled 3ff.
- artificial nose 185f.
- assay
- fluorescent resonance energy transfer (FRET)-based 146
 - ultrasensitive particle-based 134
- assembly, *see also* self-assembly
- coiled-coil 19ff.
 - DNA 20, 79ff.
 - DNA-linked particle 132
 - DNA programmed patterned 87
 - domain-swapped protein 26
 - fractal pattern 30
 - homodimer, trimer, tetramer and pentamer 20
 - layer-by-layer (LBL) 135
 - linear peptides 22
 - nanofiber 27
 - nanoparticle 39ff.
 - peptide-based 21ff.
 - protein fragment 25
- atherosclerosis 368
- atherosclerotic plaque 367
- atomic force microscopy (AFM) 197, 234
- DNA 91ff.
 - tapping mode 201
- atomic layer deposition (ALD) 163
- ATP (adenosine triphosphate) 385ff., 404ff.
- ATPase 404ff.
 - BR-ATP synthase system 413
 - F₀F₁-ATPase 404
 - hydrolysis 388
 - synthase 405ff.
- attachment
- covalent 66ff.
- Au NP, *see* gold nanoparticle
- azobenzene 7
- axon extension 352
- b**
- Bacillus anthracis* 187
- bacterial toxin 269
- bacteriorhodopsin (BR) 404
- ATP synthase system 413
 - device 411ff.
- bilayer
- lipid 404
 - planar 10
 - vesicle 11
- bimetallic effect 181
- bioanalysis 175ff.
- bioassay
- electrochemical 125, 137
 - particle-based 125
 - superamplified 135
- biocompatibility 306ff.
- material 356
- biodegradability 353
- biodetection
- DNA-based 250
- biodistribution 276
- biofuel cell 68
- biomineralization 56, 201
- biomolecular sensor 213ff.
- bionanoarray 233
- biopassivation 226f.
- biophysical methods 34
- biopolymer 40ff.
- biosensing 142ff.
- glucose 107
- biosensor
- electrochemical 137
 - electronic 70
 - fluorescent resonance energy transfer (FRET) 66
 - optical 66
- block copolymer 289
- blood 264
- half-life 325ff.
 - nanocarrier 264
- BR, *see* bacteriorhodopsin
- brain cancer 214
- breast cancer 269ff.
- Brownian ratchet 392
- bone-like hybrid material 42
- bundle
- water-soluble surface 19
- c**
- cadmium sulfide nanoparticle 51
- tag 130
- cage structure 47
- calcination 40
- calixarene-cholic acid 5
- calorimeter 181
- calveolae 270
- cancer 215
- drug delivery 305ff.
 - imaging 337
 - *in-vitro* diagnosis 213ff.

- cantilever 176ff., 237
 - adsorption-induced stress 188
 - application 179f.
 - difference measurement 185
 - functionalization 181ff.
 - measurement mode 180f.
 - metal ion sensing 186
 - micromolded 186
 - passivation layer 178
 - piezoelectric 186
 - protection layer 179
- cantilever array
 - experimental procedure 184
 - inkjet spotting 183
 - sensor 176ff.
- capillary force lithography 355
- capping strategy 150
- carbodextran 325
- carbon nanotube (CNT) 213ff.
 - DNA 91
 - drug delivery 278
 - multi-wall (MWNT) 91
 - single-wall (SWNT) 91, 216
- 5(6)-carboxyfluorescein, *see* CF
- carcinoembryonic antigen (CEA) expression 337
- cardiomyocyte 408f.
- cargo 395
- CEA, *see* carcinoembryonic antigen expression
- CCMV, *see* chlorotic cowpea mottle virus
- cell
 - cell interaction 351
 - drug delivery 305ff.
 - embryonic stem (ES) cell 350
 - entry 272
 - human mesenchymal stem (hMSC) 350
 - *in-vivo* imaging 142ff.
 - motility 248
 - neural stem cell differentiation 352
 - penetrating peptide (CPP) 272
 - QD bioconjugate 142
 - shape 248, 350
 - soluble factor interaction 351
 - substrate interaction 347
 - targeting 268
- cellulose 40f.
- cellulose/silica material 40
- cerebral spinal fluid, *see* CSF
- CF (5(6)-carboxyfluorescein) 12
- channel, *see also* artificial ion channel or ion channel
 - current 204
 - gated 4ff.
 - ligand-gated 9
 - light-gated 7
 - monomolecular 5
 - non-gated 3
 - voltage-gated 7f.
- chaperonin 47
- charge-transfer complex 9
- chemisorption 74
- β -chitin 41
- chitin/silica composite 42
- chlorotic cowpea mottle virus 49
 - cage 49
- CNT, *see* carbon nanotube
- cholesteric organic/inorganic hybrid material 40
- cholesterol 270
- cholic acid 6
- choline oxidase (ChOx)
 - AChE/ChOx enzyme cascade 106
 - Au NP 106
- circular dichroism 34
- CLIO, *see* iron oxide
- cluster dendrimer 312
- CMOS, *see* complementary metal-oxide semiconductor
- co-precipitation 325
- coating 181
- coiled-coil building block 30
- coiled-coil design 20
 - heterodimer, trimer and tetramer 20
 - metal- and heme binding 20
- collagen 18ff., 367ff.
 - triple helix 22
- complementary metal-oxide semiconductor (CMOS) 186
- complement
 - activation 277
 - receptor 267
- complexity 39
- concanavalin A 58
- conductivity detection
 - NP-induced 129
- conductivity immuno assay 130
- conjugation 289
 - strategy 149ff.
- connexin 406ff.
- connexon 407
- contrast agent 321ff., 366
 - magnetic NP 322
 - poly(amidoamine) dendrimer 312
- converter domain 389
- copolymer
 - block 289
 - polyvinylidene fluoride (PVDF) 410
 - triblock 403

- copper
 - Cu⁰ deposition 111
 - ion 9
 - covalent protein-NP conjugation 66ff.
 - bifunctional linker 74
 - chemisorption 74
 - cowpea mosaic virus (CPMV) 51, 253
 - CPP, *see* cell penetrating peptide
 - crown ether 5
 - crystallography 386
 - CSF (cerebral spinal fluid) 167
 - CT 374
 - cupric ferrocyanide NP 107
 - enzyme-stimulated synthesis 107
 - organophosphorus pesticide 107
 - current squeezing effect 198ff.
 - β -cyclodextrin 5
- d**
- DC, *see* direct current
 - DDA, *see* discrete dipole approximation
 - Debye screening 218ff.
 - dendrimer 25, 90, 287, 305ff.
 - cluster 312
 - nanocomposite 308
 - poly(amidoamine) (PAMAM) 306ff.
 - deoxyribonucleic acid, *see* DNA
 - deposition
 - layer-by-layer 358
 - dextran 275, 325
 - diagnosis
 - *in-vitro* 213ff.
 - diagnostics
 - cantilever array sensor 175ff.
 - dialkyl-naphthalene 9
 - dimer
 - cyclic peptide 5
 - β -cyclodextrin 5
 - resorcinarene 5
 - dip-pen nanolithography (DPN) 113, 234
 - DNA 235ff.
 - DNA chip 250
 - Au NP/GOx conjugate 114
 - ink 114
 - nanoarray 250
 - protein 235ff.
 - virus particle 235, 253
 - direct current (DC) 199f.
 - discrete dipole approximation (DDA) 160ff.
 - disulfide bond 29
 - DNA (deoxyribonucleic acid) 40ff., 79ff., 126ff.
 - AFM 91ff.
 - Ag NP 99
 - 5' alkylamine-modified 250
 - alkylthiol-modified 250
 - annealing for assembly 92
 - assembly 20
 - cantilever 180ff.
 - chip 250
 - detection by quartz-crystal-microbalance 100
 - DNA-linked hybrid nanostructure 43
 - DPN 235ff.
 - electrical detection 126ff.
 - gene therapy 287
 - immobilization 136, 250
 - nanotechnology 402
 - nanotube 82
 - NP self-assembly 43
 - NP-conjugate 89
 - self-assembly 402
 - single-stranded (ss) 226
 - surface-enhanced resonance Raman scattering (SERRS) 99
 - DNA hybridization 99, 180ff.
 - detection 127ff.
 - electrochemical detection 135
 - DNA lattice 81ff.
 - three-dimensional (3-D) 88
 - two dimensional (2-D) 82
 - DNA nanoarray 89, 249
 - immobilization 250
 - preparation 249
 - self-assembled, 2-D 251f.
 - DNA nanostructure 79ff., 252
 - branched base-pairing complexes 80
 - complexity 93
 - programmed patterning 84
 - self-assembly 79ff.
 - three-dimensional (3-D) 83
 - DNA tiles 81ff.
 - double-crossover complex 81
 - triple crossover complex 81
 - DNA-streptavidin-conjugate 87
 - immobilization of antibody 71
 - signal amplification 71
 - domain swapping 26
 - L-DOPA 101ff.
 - dopamine 101
 - doxorubicin 266ff., 289, 372
 - DPN, *see* dip-pen nanolithography
 - DPX (*p*-xylenebis(pyridinium)bromide) 12
 - drug
 - carrier 305
 - delivery 208, 278, 286, 305ff.
 - rational drug dosing 367
 - therapeutic 366f.

- duty ratio 390
 - low 392
- dye
 - cantilever 180
- dynamer 57
- dynammin 270
- dynein 383
- e**
- E-selectin expression 333f.
- EBL, *see* electron beam lithography
- ECL, *see* electrochemiluminescence
- ECM, *see* extracellular matrix
- EDA, *see* ethylene diamine
- EDC (1-ethyl-3-(3-dimethylaminopropyl) carbodiimide hydrochloride) 250
- elastin-like polypeptide (ELP)
 - nanostructure 246
- electrical coding 130f.
- electrical DNA assay 132
- electrochemical bioaffinity assay 125
 - biosensor 134
 - NP-based 126
- electrochemical stripping detection 132
- electrochemiluminescence (ECL) 134
- electrode
 - ion-selective 12
- electrolyte 218ff.
- electron beam 161
- electron beam lithography (EBL) 238f.
- electron microscopy 34
- electron transfer mediator 104
 - transition metal complex 104
- electronic biosensor 70
- electronic hybridization
 - quantum dot-based 132
- electropolymerization 136
- electrospinning 353ff.
- ELISA (enzyme-linked immuno sorbent assay) 213ff.
- ELP, *see* elastin-like polypeptide
- embryonic stem (ES) cell 350
- encapsulation complex 308
- endosome 272
- endothelial growth factor (EGF) receptor 2, *see* Her2/neu
- energy 408ff.
 - solar-powered biological energy source 412
- engineered transferring receptor (ETR) 335
- enhanced permeability and retention, *see* EPR enzyme
 - metallic NP 100ff.
 - NP modification 117
 - redox 104
- enzyme-linked immuno sorbent assay, *see* ELISA
- EPR (enhanced permeability and retention) 266, 287, 307
- ES, *see* embryonic stem cell
- ethanol
 - optical analysis 113
- ether conjugate 5f.
 - peptide-crown 5
- ethylene diamine (EDA) 313
- ETR, *see* engineered transferring receptor
- excitable vesicle (EV) 406ff.
- extracellular matrix (ECM) 30, 246ff., 264, 350
- f**
- F₀F₁-ATPase 404
- FA, *see* folic acid
- FACS, *see* fluorescence-assisted cell-sorting analysis
- ferritin 43, 327
 - ferritin-like protein 46
- ferrocene 128
 - Au NP-conjugate 128
- FET, *see* field effect transistor
- FFCP (4-(trifluoromethoxy)phenylhydrazone) 11
- fiber 22
 - linear peptide 22
 - nanofiber 27
- fibril 24
- fibrillogenesis 24ff.
- fibrin 366ff.
- fibronectin 248
- field effect transistor 216ff.
 - ion 216
- filament 385
- finite-difference time-domain (FDTD) method 160ff.
- fluid mosaic model
 - Singer-Nicholson 403
- fluorescence 12, 208
 - pH-sensitive dye 12
 - two-photon optical fibre fluorescence (TPOFF) 315
- fluorescence-assisted cell-sorting (FACS) analysis 337
- fluorescent resonance energy transfer (FRET) 66, 146ff.
 - apoptosis-detecting 311
 - quantum dot 146
- fluorophore coupling 50
- fluorophore-quencher pair 12

Fmoc-strategy 33
 focused ion beam (FIB) lithography 292
 folate 289
 folic acid (FA) 309
 – receptor (FAR) 309
 force 394
 – generation 388
 – stall 394
 Fourier transform infrared and UV-visible spectroscopy 34
 FRET, *see* fluorescent resonance energy transfer
 fumagillin 372
 functionalization 183ff.
 – microfluidic network (μ FN) 182
 functionalized surface 178
 FWHM, *see* spectral peak

g

G-protein 387
 gadolinium 297, 366
 gap junction 407
 gecko tape 402
 gel 30
 gel-solution transition 32
 gene
 – expression 335
 – splicing 402
 GFP (green fluorescent protein) 240
 glioblastoma 214f.
 glucose 105
 – microcantilever 187
 – sensing 100
 glucose oxidase (GOx) 45, 105ff.
 gold nanocage 271
 gold nanoparticle (Au NP) 21, 44ff., 99ff., 126ff., 241
 – absorbance spectra 102
 – AChE/ChOx enzyme cascade 106
 – antigen-antibody complex 99
 – based stripping procedure 127
 – conjugate 89
 – Cu⁰ deposition 111
 – deposition 101
 – DNA 89, 99
 – dopamine 101
 – growth mechanism 106
 – H₂O₂ 101
 – label 99
 – NAD⁺-dependent biocatalytic transformation 113
 – NADH-stimulated 108ff.
 – oligonucleotide-modified 249
 – shaped 112f.

– streptavidin-coated 133
 gold nanorod 285
 gold nanowire 114
 GOx, *see* glucose oxidase
 gramicidin A 4
 green fluorescent protein, *see* GFP

h

half-channel dimer 5
 heat shock protein (HSP) 46ff.
 α -helix 18, 30ff.
 helix-helix-interface 25
 hemoglobin (Hb) 45
 hepatotoxicity 277
 heptad repeat 19
 Her2/neu (human endothelial growth factor [EGF] receptor 2) 310, 338
 – expression 337
 – tyrosine kinase 269
 herpes simplex virus (HSV) 49
 heterodimer
 – sticky-ended 22ff.
 hMSC (human mesenchymal stem cell), *see* cell
 Holliday junction 81f.
 hopping 390
 HPTS (8-hydroxypyrene-1,3,6-trisulfonic acid trisodium salt) 12
 HRE domain 42
 HSP, *see* heat shock protein
 HSV, *see* herpes simplex virus
 hybrid cellulose/silica nanocomposite 40
 hybrid nanostructure
 – DNA-linked 43
 – self-assembly 42
 hybridization assay 131
 – electrochemical triple-amplification 127
 hydrogel 31f., 291, 355
 – coiled coil 33
 hydrogen bonding 40f.
 hydrophobic residue 19
 8-hydroxypyrene-1,3,6-trisulfonic acid trisodium salt, *see* HPTS

i

identification sphere 131
 imaging 141ff.
 – cell 142ff.
 – *in-vivo* 142ff.
 – shear force controlled 205f.
 – tissue 142
 – ultrasound imaging 373

- imaging agent 365f.
 - nanocarrier-mediated delivery 263ff.
 - immobilization
 - antibody 71
 - DNA 250
 - protein 243
 - virus 253
 - immunoassay 214
 - quantum dot 146
 - immunoglobulin 130, 267
 - immunohistological analysis 332
 - immunoliposome 271
 - immunosensor array
 - label-free 187
 - imprint lithography 294
 - indium 374
 - inkjet spotting 183
 - functionalization 183ff.
 - integrin 366ff.
 - receptor 267
 - interaction
 - cell-cell 351
 - cell-soluble factor 351
 - cell-substrate 347
 - cell-surface 246
 - molecular motor 395
 - non-covalent 17, 31
 - iodinated oil 374
 - ion channel 406f.
 - activity 10ff., 208
 - aggregate 4
 - artificial 3ff.
 - gated 6ff.
 - ligand-gated 9f.
 - light-gated 7
 - monomolecular 5f.
 - non-gated 3
 - peptide-based 4
 - voltage-gated 7
 - ion current measurement 204
 - IQ motif 389ff.
 - iron oxide
 - cross-linked (CLIO) 326
 - water-soluble (WSIO) 329ff.
 - iron oxide nanoparticle 286, 325
 - dextran-coated 325
 - 2,3-dimercaptosuccinic acid (DMSA)-coated 329
 - monocrystalline (MION) 326ff.
 - non-hydrolytically synthesized 329
 - polycrystalline 325
 - polyethylene glycolylated 329
 - polymeric phosphine oxide ligand 329
 - silica-coated 325
 - toxicity 342
- k**
- K⁺ channel 208
 - kinesin 383
 - light chain 395
 - kinetics
 - surface binding assay 219ff.
 - Kupffer cell 268
- l**
- laser trap 394
 - LBL, *see* assembly, layer-by-layer
 - LCST, *see* lower critical solution temperature
 - leakage current 204
 - leucine zipper 20ff.
 - heptad 30
 - self-assembling 32
 - lever arm 389ff.
 - LHRH, *see* luteinizing hormone-releasing hormone
 - ligand 142ff., 268ff.
 - targeting 365
 - linker 275
 - belt-and-braces 21
 - bifunctional 74, 137
 - peptide-based 21
 - lipid
 - bilayer 404
 - membrane 403
 - liposome 273ff., 286ff., 405ff.
 - biodistribution 276
 - drug delivery 273
 - lipoplexes 274
 - long-circulating 289
 - lithography 292
 - AFM-based 234ff.
 - capillary force 355
 - electron beam (EBL) 238f.
 - focused ion beam (FIB) 292
 - imprint 294
 - nanoimprint (NIL) 240
 - nanosphere (NSL) 241
 - photolithography 292f.
 - soft 354f.
 - local dielectric environment 159
 - localized surface plasmon resonance (LSPR) 159ff.
 - biosensor 159ff.
 - nanofabrication 162
 - spectroscopy 162
 - lower critical solution temperature (LCST) 246

- LSPR, *see* localized surface plasmon resonance
- lumazine synthase 46
- luminescent semiconductor nanocrystal 141ff.
- luteinizing hormone-releasing hormone (LHRH) 310
- lymphoma 269
- lysosome 267
- m**
- macropinocytosis 270
- magnetic bead 133
- magnetic resonance imaging (MRI) 321ff., 366
 - contrast agent 312
 - NP-assisted 322f.
 - T2-weighted 332ff.
- magnetic moment 323
 - size-dependent 323
- magnetic relaxation process 322
 - spin-spin relaxation 322
- magnetodendrimer 327
 - core size 327
 - saturation magnetism 327
 - T2 relaxivity 327
- magnetoferritin 327
 - blood half-life 327
 - T2 relaxation 327
- magnetoliposome 327
 - core size 328
 - T2 relaxivity 328
- MALDI-TOF (matrix-assisted laser desorption/ionization-time of flight) 314
- 5-maleimidofluorescein 51
- mannose 58
- mass magnetization 323
- matrix 30f.
 - extracellular (ECM) 30
 - α -helical fibrillar 30
 - programmed 30
- matrix-assisted laser desorption/ionization-time of flight, *see* MALDI-TOF
- Mb, *see* myoglobin
- MCLCP, *see* polymer
- melanosome 395
- melt-blowing 353
- membrane protein 403
- MEMS, *see* micro-electro-mechanical system
- 16-mercaptohexadecanoic acid, *see* MHA
- 3'-mercaptopropyltrimethoxysilane, *see* MPTMS
- mesenchymal stem cell
 - human (hMSC) 350
- mesoscale particle 90
- mesoscale underaddressed functionalized features indexed by shape (MUFFINS) 293
- mesoscopic fiber 26
- metal and heme binding coiled-coil system 20
- metal deposition
 - NP 99ff.
- metal nanowire 113
 - Au NP 113
- metallic nanocircuitry 117
 - biocatalytic template 117
- metallic nanoparticle 43, 100ff., 126ff., 308
 - cofactor-induced synthesis 107ff.
 - enzyme-stimulated synthesis 100ff.
 - glucose-sensing 100ff.
 - surface modification 116
 - synthesis 107
- metastasis 266
- MHA (16-mercaptohexadecanoic acid) 250ff.
- micelle 286ff.
 - core-surface cross-linked 290
- micro-electro-mechanical system (MEMS) 409
- microcontact printing (μ CP) 240, 355
- microemulsion 291
 - inverse 291
- microfabrication 355
- microfilament 383
- microfluidic environment 222
- microfluidic gradient generator 352
- microfluidic network (μ FN) 182
- microfluidic patterning 355
- microfluidics 189, 222ff., 291f.
- microfluidizer 368
- microgenerator
 - piezoelectric 409
- micromolding 355
- microorganism 39, 52ff.
- microtubule 383
 - minus end 395
- mineralization 40
- mineralized biology 54
- mini-emulsion technique 291
- miniaturization
 - protein assay 244
- MION, *see* iron oxide nanoparticle
- mitochondrial membrane permeability 311
- molecular assembly 79ff.
 - patterned 79ff.
- molecular dipole 8
- molecular imaging 321ff.
 - angiogenesis 333

- molecular imaging (*cont.*)
 - apoptosis 334
 - cancer imaging 337
 - gene expression 335
 - infarction 332
 - inflammation 332
 - magnetic resonance 331
- molecular motor 383ff.
 - interaction 395
- mononuclear phagocyte system (MPS) 263, 306
- motor domain 386f.
 - minus end 393
 - plus end 393
- motor-cargo interaction 395
- MPS, *see* mononuclear phagocyte system
- MPTMS (3'-mercaptopropyltrimethoxysilane) 250
- MRI, *see* magnetic resonance imaging
- MUFFINS, *see* mesoscale underaddressed functionalized features indexed by shape
- muscle power 409
- MWNT, *see* carbon nanotube
- myoblast 348
- myocyte 411
- myoglobin (Mb) 45
- myosin 383
 - converter domain 393
 - light chain 389
- n**
- NADH (nicotinamide adenine dinucleotide) 107
 - Cu⁰ deposition 111
 - metallic NP synthesis 107
- NADPH (nicotinamide adenine dinucleotide phosphate) 107
 - metallic NP synthesis 107
- nanoarray 242ff.
 - DNA 249f.
 - DNA immobilization 250
 - DNA preparation 249
 - DPN 250
 - dynamic 246
 - motile 246
 - protein 242f.
- nanobiotechnology 99f.
- nanocage 271
 - gold 271
- nanocarrier 263ff.
 - smart 276
 - toxicology 277
- nanocircuitry 117
 - biocatalytic template 117
- nanocontact printing (nCP) 240
- nanocrystal 126ff.
 - inorganic 126ff.
- nanocube
 - silver 166
- nanodevice 401ff.
 - hybrid 401ff.
- nanofabrication 223ff.
- nanohybrid 69
- nanoinprint lithography (NIL) 240
- nanomedicine 285
- nanomotor
 - biological 383ff.
- nanoparticle (NP) 21, 65ff., 159
 - array 162
 - biocompatible 323
 - cadmium sulfide 130
 - composite material 349
 - conductive path across electrodes 99
 - contrast agent 321ff.
 - core shell copper-gold 134
 - covalent protein-conjugate 66ff.
 - cupric ferrocyanide 107
 - deposition of metal 99
 - delivery of therapeutics 263ff.
 - diagnostic targeted 365ff.
 - dipod, tripod, tetrapod 112
 - electrochemical bioassay 125
 - enzyme-stimulated synthesis 100ff.
 - glucose-sensing 100
 - gold 21, 99ff.
 - gold-coated iron core-shell 134
 - inorganic 321ff.
 - iron oxide 323
 - label 99ff., 132
 - LSPR 161
 - magnetic 321ff.
 - medicine 285ff.
 - metallic 43, 100ff., 126, 308
 - modification of enzyme 117
 - monodisperse solution-phase 164
 - multifunctional 305ff.
 - non-covalent protein-conjugate 69ff.
 - poly(amidoamine) (PAMAM) dendrimer-based 306ff.
 - polymeric 263
 - self-assembled 44
 - self-assembled monodispersed metallic 42
 - semi-conductor 56, 90, 137
 - shaped 112f.
 - silica 43
 - superparamagnetic iron oxide 323

- nanopattern 243ff.
 - metallic 100ff.
 - protein immobilization 243ff.
 - nanopipette 198ff.
 - deposition 237
 - double-barreled 238
 - nanopropeller 246
 - nanoreactor 43
 - nanorod 90, 285
 - nanoscale-linker system 20
 - nanosensor 222
 - fabrication 223
 - nanosphere lithography (NSL) 161, 241
 - nanostructure 39ff.
 - DNA 79ff., 252
 - DNA-linked hybrid 43
 - self-assembling from coiled-coil peptides 17ff.
 - nanotechnology 285
 - DNA 402
 - nanotopography 349ff.
 - nanotriangle
 - solution-phase NSL-fabricated 164
 - nanotube (NT) 137
 - carbon 213ff.
 - label-free 213ff.
 - nanosensor 226
 - nanowell array 163
 - nanowire (NW) 28, 113ff., 137, 213ff.
 - label-free 213ff.
 - metal 113f.
 - nanosensor 226
 - telomere 113
 - nCP, *see* nanocontact printing
 - neck linker 389
 - neural stem cell differentiation 352
 - neuron 348, 406
 - neurotransmitter 101
 - Au NP 101
 - nicotinamide adenine dinucleotide, *see* NADH
 - nicotinamide adenine dinucleotide phosphate, *see* NADPH
 - NIL, *see* nanoimprint lithography
 - NMR
 - ²³Na 11
 - non-covalent protein-NP conjugate 69ff.
 - electrostatic interaction 72
 - metal-mediated complexation 73
 - protein-ligand interaction 73
 - refolding 71
 - release 71
 - noradrenaline 101
 - NP, *see* nanoparticle
 - NSL, *see* nanosphere lithography
 - NT, *see* nanotube
 - nucleic acid, *see also* DNA or RNA
 - aptamer 272
 - NW, *see* nanowire
- o**
- oligonucleotide 50
 - heat shock protein (HSP) 242ff.
 - nanoarray 250
 - on/off antigen binding rate 219
 - opsonin 268
 - optical biosensing 66
 - fluorescent resonance energy transfer (FRET) 66
 - optical beam deflection 179ff.
 - organic/inorganic composite material 201
 - (organo)phyllosilicate 45
 - organism 39, 54ff.
 - Os(II) bispyridine-4-picolinic acid 105
- p**
- P-loop motif 387
 - packing
 - knobs-into-holes 19
 - paclitaxel 276, 297f., 372
 - PAMAM, *see* poly(amidoamine)
 - paraoxon 104
 - particle replication in nonwetting templates (PRINT) 287ff.
 - passivation 274
 - patch-clamp experiment 208
 - patterning
 - assembly-based 241
 - microfluidic 355
 - pauciparameter 214
 - PCL, *see* polycaprolactone
 - PDMS, *see* polydimethylsiloxane
 - PEG, *see* polyethylene glycol
 - peptide 4f., 21f.
 - amphiphilic 353
 - coiled-coil 17ff.
 - cyclic 5
 - fibrous assembly 23
 - folding 34
 - library 271
 - linear 22
 - natural 27
 - nonlinear 25
 - peptide-folding motif 18
 - peptide-crown ether conjugate 5
 - SAF 24f.
 - self-assembly 17ff., 353
 - synthesis 33
 - synthetic 40

- perfluorocarbon (PFC) 365ff.
 – NP 365ff.
- perfluoropolyether-based elastomer (PFPE) 294
- pesticide
 – organophosphorus 107
- PFC, *see* perfluorocarbon
- PFPE, *see* perfluoropolyether-based elastomer
- PGS, *see* poly(glycerol sebacate)
- pH-stat experiment 11
- phage display 271
 – *in-vivo* 271
- phagocyte system 263ff.
 – mononuclear cell 267
- phagocytosis imaging 323
- phase separation 353
- phospholipid 289, 365
- photolithography 292f.
- photopolymerization 355
- PIE, *see* polyethyleneimine
- piezoelectric detection 179
 – tuning fork sensor 203
- piezoelectric microgenerator 409
- piezoelectric transducer 408
- piezoresistive detection 179
- pinocytosis 270
- PLGA, *see* poly(lactic-co-glycolic acid)
- PLLA, *see* poly-L-lactic acid
- PMMA, *see* poly(methylmethacrylate)
- PNA, *see* polypeptide nucleic acid
- PNIPAAm, *see* poly-N-isopropylacrylamide
- poly- β -(1-3) glucose 41
- poly-N-isopropylacrylamide (PNIPAAm) 409
- poly-L-lactic acid (PLLA) 287, 353
- poly-L-lysine 249
- poly(amidoamine) (PAMAM) 306ff.
- poly(amidoamine) dendrimer 306ff.
 – biological property 306
 – characterization 314
 – encapsulation complex 308
 – FRET-based apoptosis-detecting 311
 – fluorescence 315
 – MRI contrast agent 312
 – multifunctional covalent 308
 – physical parameter 315
 – structure 306
 – synthesis 313
 – toxicity 307
 – tumor cell 310
- poly(aryl ether) 306
- poly(cyanoacrylate) 297
- poly(glycerol sebacate) (PGS) 356
- poly(lactic-co-glycolic acid) (PLGA) 296, 350ff.
- poly(methylmethacrylate) (PMMA) 239, 250
- poly(propylene imine) (PPI) 306
- poly(pyrrole) (Ppy) 296
- polycaprolactone (PCL) 353
- polydimethylsiloxane (PDMS) 182, 240, 292, 350ff., 404
- polyethylene glycol (PEG) 274, 286, 413
 – diacrylate 292
- polyethyleneimine (PIE) 238
- polyglutamate 10
- polyhistidine 9
- polymer
 – ABA polymersome 404ff.
 – amphiphilic 290
 – biodegradable 287
 – block copolymer 289
 – drug conjugate 286
 – main-chain liquid crystalline (MCLCP) 291
 – triblock copolymer 403
- polymer hydrogel
 – stimuli-sensitive 31
- polymersome 404ff.
- polypeptide 42
 – cyclic D,L-polypeptide 42
- polypeptide nucleic acid (PNA) 91
- polysaccharide 40
 – cantilever 180
- polyvinylidene fluoride (PVDF) 410
 – copolymer 410
- pore 264
- position-sensitive detector (PSD) 179
- PPI, *see* poly(propylene imine)
- Ppy, *see* poly(pyrrole)
- PRINT, *see* particle replication in nonwetting templates
- printing
 – microcontact printing (μ CP) 240, 355
 – nanocontact (nCP) 240
 – three-dimensional (3DP) 352ff.
- processivity 390
- prostate-specific antigen (PSA) 185ff.
- prostate-specific membrane antigen (PSMA) 275
- protein 18ff., 44, 126ff., 235ff.
 – 3D folded structure 44
 – A 243
 – A/G 243
 – assay miniaturization 244
 – bioluminescent 149
 – cantilever 180
 – covalent NP-conjugate 66ff.
 – DNA interaction 185
 – domain-swapped 26
 – DPN 235ff.
 – electrochemical detection 126

- protein (*cont.*)
- fiber assembly using protein fragments 25
 - G 243
 - immobilization 243
 - ligand interaction 73
 - membrane 403
 - misfolding 22
 - non-covalent NP-conjugate 69ff.
 - plasma 264
 - protein interaction 18
 - refolding 71
 - release 71
 - spherical cage morphology 46
 - toolbox 404
- proteopolymersome 415
- proton carrier 11
- Prussian blue staining 332
- PSD, *see* position-sensitive detector
- PVDF, *see* polyvinylidene fluoride
- q**
- quantum dot (QD) 126ff., 141ff., 271ff., 286
- bioconjugate 142ff.
 - FRET 146ff.
 - luminescent 142ff.
 - semiconductor nanocrystal 141ff.
- quartz-crystal-microbalance 100
- r**
- reactive ion etching (RIE) 163, 293
- reactive oxygen species (ROS) 278
- receptor 267ff.
- folic acid (FAR) 309
 - integrin 267
 - scavenger 267
 - transferring 270
- redox enzyme 104
- refractive index unit (RIU) 164
- RES, *see* reticuloendothelial system
- resorcinarene 5
- reticuloendothelial system (RES) 324ff.
- reverse-phase evaporation 289
- rhodamine 311
- ribonucleic acid, *see* RNA
- RIE, *see* reactive ion etching
- RIU, *see* refractive index unit
- RNA (ribonucleic acid) 271ff.
- aptamer 275
 - gene-splicing 402
 - ribozyme 402
 - self-assembly 402
 - small interfering (siRNA) 271
- ROS, *see* reactive oxygen species
- s**
- SAF, *see* self-assembling fiber
- SAM, *see* self-assembled monolayer
- safranin O 12
- scanning confocal microscopy 207
- scanning electron microscopy (SEM) 128
- scanning ion conductance microscopy (SICM) 197ff., 237
- AFM distance control 200f.
 - non-contact configuration 199
 - shear force controlled 200ff.
 - tapping mode based 201
- scanning near-field optical microscopy (SNOM) 207f.
- scavenger receptor 267
- Schizophyllan 41
- Schottky barrier 218
- SCIM, *see* scanning ion conductance microscopy
- SCK, *see* shell-crosslinked knedel
- screen-printed electrode transducer 132
- SEC, *see* size-exclusion chromatography
- SELEX 252
- self-assembled monolayer (SAM) 164
- self-assembling fiber (SAF) 23ff.
- peptide 24ff.
- self-assembly 39, 79ff., 152, 353
- algorithmic 84
 - amphiphilic peptid 353
 - directed 86
 - DNA 79ff., 402
 - DNA-based nanoparticle 43
 - RNA 402
- self-replicating system 20
- SEM, *see* scanning electron microscopy
- semiconductor nanocrystal 141ff.
- semiconductor nanoparticle 56, 90, 137
- sensing 142ff.
- environment 218
- sensor
- biomolecular 213ff.
 - nanotube 213ff.
 - nanowire 213ff.
- sequence-to-structure relationship 20
- SERRS, *see* surface enhanced resonance Raman scattering
- shear force detection 202
- β -sheet 22
- shell-crosslinked knedel (SCK) 290
- SICM, *see* scanning ion conductance microscopy
- silica nanoparticle 43
- silica nanostructure
- one-dimensional 41

- silicon nanowire 216ff.
 - n-type 216
 - p-type 216
 - silver 128
 - silver nanocube 166
 - silver nanoparticle 126
 - silver nanowire
 - Au NP-functionalized alkaline phosphatase 114
 - synthesis mechanism 114
 - silver/silver chloride (Ag/AgCl) electrode 204
 - Singer-Nicholson fluid mosaic model 403
 - single nucleotide polymorphism (SNP) 133
 - single photon emission computed tomography (SPECT) 374
 - Si NW, *see* silicon nanowire
 - size-exclusion chromatography (SEC) 313f.
 - slithering 390
 - sticky end assembly 22
 - SNAP, *see* superlattice nanowire pattern transfer
 - SNOM, *see* scanning near-field optical microscopy
 - SNP, *see* single nucleotide polymorphism
 - soft lithography 354f.
 - solar-powered biological energy source 412
 - solid-phase peptide synthesis (SPPS)
 - Fmoc-strategy 33
 - SPECT, *see* single photon emission computed tomography
 - spectral peak
 - full-width-half-maximum (FWHM) 162
 - sphingolipid 270
 - SPIO, *see* superparamagnetic iron oxide splenomegaly 277
 - SPPS, *see* solid-phase peptide synthesis
 - stall force 394
 - stepping 390
 - striped metal microrod 131
 - SuNS, *see* supramolecular nanostamping
 - superlattice nanowire pattern transfer (SNAP) 223
 - nanowire 224
 - superparamagnetic iron oxide (SPIO) 323, 335
 - superstructure
 - cholesteric 40
 - supramolecular design
 - coiled-coil peptides 18
 - supramolecular nanostamping (SuNS) 241
 - supramolecule 17ff.
 - surface
 - energy 294
 - modification 329
 - passivation 274
 - surface enhanced resonance Raman scattering (SERRS) 99
 - nucleic acid hybridization 99
 - spectra with Ag NP 99
 - surface stress 179ff.
 - compressive 179
 - resonance behaviour 188
 - tensile 179
 - surfactant 289, 365
 - switch I motif 387f.
 - switch II motif 387ff.
 - SWNT, *see* carbon nanotube
 - synthesis
 - block copolymer-mediated 40
 - nanostructure 39ff.
 - surfactant-mediated 40
 - templated 40, 52
 - synthetic polymer-coiled-coil hybrid 31
- t**
- T2 relaxivity 323ff.
 - technetium 374
 - tecto dendrimer 312
 - telomere 113
 - TEM, *see* transmission electron microscopy
 - template 39ff.
 - biomolecular 39ff.
 - biopolymeric 42
 - synthesis 353
 - TEOS, *see* tetraethoxysilane
 - TER, *see* transepithelial electrical resistances
 - ternary coiled-coil assembly 20
 - tetraethoxysilane (TEOS) 53
 - tetramethylorthosilicate (TMOS) 413
 - therapeutic agent 366f.
 - nanocarrier-mediated delivery 263
 - thiol-selective agent 50
 - thrombin-aptamer 108ff.
 - Au NP 109
 - tight junction 206
 - tissue
 - engineering 28, 347ff.
 - factor 366ff.
 - titanium nitride 292
 - TMOS, *see* tetramethylorthosilicate
 - TNF- α , *see* tumor necrosis factor α
 - tobacco mosaic virus (TMV) 49, 253
 - toxicity
 - poly(amidoamine) dendrimer 307
 - toxicology 277
 - nanocarrier 277

- TPOFF, *see* two-photon optical fiber
 fluorescence
 transcytosis 264ff.
 transducer
 – piezoelectric 408
 transepithelial electrical resistances (TER)
 197
 transepithelial permeability 264
 transmembrane
 – ion flux detection 10ff.
 – pore 4
 – transport 7
 transmission electron microscopy (TEM)
 165, 411
 4-(trifluoromethoxy)phenylhydrazine, *see*
 FFCP
 tubulin 385
 tumor 266ff., 310, 369ff.
 tumor necrosis factor α (TNF- α) 218
 two-photon optical fiber fluorescence (TPOFF)
 315
 tyrosinase 103
 tyrosine kinase 215
- u**
 ultracentrifugation 34
 ultrasound imaging 373
- v**
 vapor
 – cantilever 180ff.
 – vapour-liquid-solid (VLS) growth 223
- vascular smooth muscle cell (VSMC) 371
 vasculature 263ff.
 – endothelium 264
 – permeability 265
 vertical cavity surface emitting laser (VCSEL)
 179
 vesicle 11
 – excitable (EV) 406ff.
 – fluorescence 12
 – ion-selective electrode 12
 – ^{23}Na -NMR 11
 – pH-stat 11
 virus 54ff., 269
 – adenovirus 53
 – chlorotic cowpea mottle virus 49
 – cowpea mosaic virus 51
 – DPN 235, 253
 – herpes simplex virus 49
 – nanoarray 253f.
 – tobacco mosaic virus 49
 VLS (vapor-liquid-solid), *see* vapor
 voltametric stripping 100
 VSMC, *see* vascular smooth muscle cell
- w**
 WSIO, *see* iron oxide
- x**
p-xylenebis(pyridinium)bromide, *see* DPX
- z**
 zinc sulfide nanoparticle 51