

## Index

### a

Absorber atom 174  
 Absorbing efficiency 330  
 Absorption edge 173, 191  
 Absorption threshold 173, 191  
 Absorption phenomena 187  
 Active targeting 303, 306, 307  
 Adenovirus 253  
 Adhesion molecule 235  
 Adriamycin 291, 304, 307, 313, 314  
 Aggregation of DNA 274  
 Alcohol reduction 8  
 Alumina membrane 73  
 Amphiphilic block copolymer 73  
 Analyte-specific reagents 399  
 Angiogenesis 228  
 Antibodies 254  
 Antibody-antigen recognition 63  
 Application in disease 344  
*Aquaspirillum magnetotacticum* 120  
 Arc-discharge, electric arc 43  
 SAXS – see SAXS  
 Assembler 393  
 Artificial retina 410  
 Atherosclerosis 228  
 Atomic force microscopy 126, 271, 378, 379, 380  
 Atomic scattering 142  
 Autocorrelation function 269

### b

*Bacillus globigii* 370  
*Bacillus megaterium* 370  
 Bacteriophage 121  
 Bimetallic preparations 12  
 Biocellulose 76  
 Biocompatibility 295, 298, 299, 300, 301, 304, 344  
 Biodegradability 354

Biodegradable polymers 298, 299, 301  
 Biological agents 366  
 Biological sensing 81  
 Biological threats 365  
 Biomedical sensing 81  
 Bio-meta bimetallic preparations 22  
 Biomimetic 62, 119  
 Bio-mineralization 125  
 Biomolecular recognition 62  
 Biosensors 50  
 Biotin/streptavidin recognition 63  
 Biotinylated proteins 62  
 Blood brain barrier 302, 306  
 Block to block interaction 61  
 Borohydride reduction 9  
 Bottom-up methods 4, 67  
 Bragg angle 164  
 Bragg condition 164, 165, 189  
 Breast cancer 256, 333  
 Buckminsterfullerene 391  
 Building blocks 57

### c

Cadmium sulfide 123  
 Calcite 123  
 Capillary force 58  
 Capping molecules 58  
 Carbon 33  
 Carbon black 408  
 Carbon nanofibers 38  
 Carbon nanomaterials 33  
 Carbon nanotube based sensing 81  
 Carbon nanotubes 39  
 Carbon nanotube architectures 45  
 Carbon nanotubes-structure 156  
 Carbon nanotubes-diffraction 156  
 Carcinoma 279  
 Caron onions 38  
 Cationic lipids 259

- Cell Surface Display (CSD) 121
  - Cellular uptake 254
  - Cellular imaging 231
  - CE mark 400
  - Charge distribution 188
  - Chemical decontamination 366
  - Chemical environment 174
  - Chemical sensing 81
  - Chemical shift 174
  - Chemical vapor deposition 45, 78
  - Chitosan 267, 300
  - Cholesteric phase 271
  - Circular dichroism 99, 277
  - Circulation time 294, 296, 298, 301, 304
  - Circumferential winding 278
  - Cisplatinum 301
  - Clinical trials 302-305
  - Cobalt hexamine 254
  - Collagen folding 101
  - Collagen structural hierarchy 96
  - Collagen secondary structure 98
  - Combinatorial biology 121
  - Condensation of DNA 254
  - Conformation of DNA 277
  - Confocal microscopy 261
  - Contact mode 271
  - Contour length 273
  - Controllable synthesis 45
  - Contrast agents 231, 328
  - Core/shell ratio 329
  - Counter ions 254
  - Cubic mesostructure 74
  - Cucurbitacin 300
  - Cyborgs 407
- d**
- Darkfield microscopy 333
  - Dendrimers 262, 392
  - Dextran 298, 306, 310
  - Decomposition of metal complexes 17
  - Decontamination 366, 367
    - Biological agents 366
    - Chemical methods 366
    - Mechanism 369, 370
    - Nanomaterials 367
    - Spores 370
  - Diagnostics 49
  - Diagnostic applications 304
  - Diffusion coefficient 269
  - Diffraction
    - Convergent-beam electron diffraction (CBED) 141
    - Nano-area electron diffraction (NED) 139
    - Selected-area electron diffraction (SAED) 139
    - Theory 142
  - Dip-pen lithography technique 69
  - DNA-assisted assembly 62
  - DNA delivery 308
  - DNA sequencing 122
  - DNA technologies 121
  - DNA templates 22
  - Dormancy 290
  - Doxorubicin 291, 302, 306, 307, 313, 314
  - Double quantum-filtered correlation spectroscopy (DQF-COSY) 99
  - Drug delivery 125, 293-296, 298, 299, 301, 303, 348
  - Drug inactivation 294-296
  - Drug sequestration 348
  - Drug toxicity 291, 295, 300
  - Drug transport 292, 297, 297
  - Dynamic light scattering 268
- e**
- Education 375, 383, 387
  - Electrochemical synthesis 14
  - Electrodeposition 74
  - Electron density 189
  - Electron microscopy 269
  - Electroosmotic flow 70
  - Electrophoretic assembly 71
  - Electrostatic 58
  - Electronic structure 172, 174, 190
  - Electrostatic stabilization 5
  - Endocytosis 254, 297
  - Endothelial cells 292
  - Enhanced permeability effect 293, 297
  - Epirubicin 304, 305
  - Epitaxial crystal growth 78
  - ETC 406
  - Ethidium bromide 256
  - EXAFS 174, 180
  - EXAFS formula 191
  - Extracellular matrix 95
  - Extracellular matrix mimics 108
- f**
- Fat fingers 395
  - Ferrofluids 304, 305, 310
  - Fibrin 228
  - Fibronectin 103
  - Field effect transistor (FET) 81
  - Filtration of magnetic nanoparticles 344
  - Fingerprint approach 176
  - Form factor 169

- Fourier transform 169, 170, 188, 190  
 Free propagator 191  
 Fullerenes 35  
 Full multiple scattering 191
- g**
- Gadolinium neutron capture therapy 300, 306  
 Gallium arsenide 123  
 Gas sensing 81  
 Gene delivery 253  
 Gene therapy 307  
 Genetically engineered proteins for inorganics (GEPs) 121  
 Genomics 126  
 Gold 123  
 Globules 274  
 Green goo 407  
 Green's function 191  
 Grey goo 407  
 Guinier approximation 171
- h**
- Hands-on 384  
 Halogen adducts 368  
 Hamiltonian  
 – for interaction matter-radiation 187  
 – for radiation field 187  
 – ground state for matter 187  
 Hematotoxicity 291, 295, 305  
 Hemodialysis 344  
 HER2 333  
 Hexagonal mesostructure 74  
 Hexagonal packing 253  
 High-density information storage 84  
 Hierarchical structure 65  
 High-resolution electron microscopy 147  
 Hormone dependent cancer 290, 303  
 Hormone independent cancer 290  
 Human trials 302-305  
 Hyperpermeable vasculature 296  
 Hydration 277  
 Hydrodynamic radius 269  
 Hydrogen bonding 58  
 Hydrophobic interactions 259  
 Hyperpermeable vasculature 295, 304, 309-312
- i**
- Image contrast 232  
 Imaging 49  
 Immunoabsorption 345  
 Immune system 253
- Integrin 235  
 Interference, destructive 169  
 Interference function 170  
 Interference pattern 173, 176  
 Interstitium 293, 296, 297  
 Investigational device exemption 398  
 Investigational new drug application 398  
 In vivo experiments 359  
 Ionization energy 173  
 Ionization threshold 173  
 Irinotecan 302  
 Iron Oxide 123, 233
- k**
- Kemp triacid (KTA) 106
- l**
- Lamellar mesostructure 74  
 Langmuir-Blodgett techniques 72  
 Laser ablation 44  
 Laser light scattering 268  
 Layer-by-layer deposition 61  
 Learning 378, 379, 382, 383, 384, 388  
 Leuvectin 279  
 Ligands 306  
 Lipids 259  
 Liquid crystalline DNA 264  
 Liquid crystal phase 61  
 Liquid crystals 73  
 Local environment 174  
 Long range order 174  
 Low dimensional 57  
 Lysosomes 297  
 Lymphatic system 296, 300  
 Lymph node metastases 300
- m**
- Macrophage 294, 296, 298, 299, 307  
 Magic number nanoclusters 8  
 Magnesium oxide 367  
 Magnetic nanoparticles 120, 295, 299, 303–306, 307, 309–312  
 Magnetic nanoparticle toxicity 349  
 Magnetic resonance imaging 227  
 MALDI-TOF MS 112  
 Materials science 20  
 Mesoporous silica 74  
 Membrane pores 292  
 Metastases 290  
 Metallic nanowire based sensing 83  
 Metal quantum wires 83  
 Metal salt reduction 8  
 Microcontact printing techniques 69

- Microwave decomposition 17
  - Mie scattering theory 328
  - Mitoxantrone 301, 302, 305, 306
  - Models 380, 381
  - Modes of stabilization 5
  - Molecular beam epitaxy, MBE 128
  - Molecular biomimetics 119
  - Molecular erector sets 120
  - Molecular imaging 231
  - Monodispersity 262
  - Mononuclear phagocytic system 296
  - Morphogenesis 126
  - Multicomponent assembly 60
  - Multi drug resistance 291, 292, 294, 295, 313, 314
  - Multiplayer deposition 21
  - Multi-walled nanotubes, MWNT 40
  - Myocardial infarction 228
- n**
- Nanobelts 61
  - Nanobiomedicine 391
  - Nanobiotechnology 125, 382, 383
  - Nanoclusters 158
  - Nanocapsules 298, 299, 303
  - Nanofilament bundles 65
  - Nanoinorganics 130
  - Nanomaterials 367
  - Nanomedicine taxonomy 392
  - Nanoparticle assembly 58
  - Nanoparticle classification 233, 295
  - Nanoparticles
    - CdS 185
    - Co 176
    - core-shell 177
    - formation of 183, 185, 253
    - PdPt 180
    - Pt 183
    - ZnS 185
  - Nanoporous activated carbon 42
  - Nanorods 61
  - Nanoscale diamonds 41
  - Nanoshells 327
  - Nanospheres 298, 301, 302, 303, 313
  - Nanostructure array 78
  - Nanostructured systems 57
  - Nanotechnology 125, 253, 375, 376, 377, 379, 380, 382, 384, 385, 386, 387, 388
  - Nanotubes 61
  - Nanowires 61
  - Nanowire thin film transistors (TFTs) 84
  - Near infrared (NIR) 327
  - Nested fullerenes 38
- NEXAFS 174
- NIR photothermal therapy 334
  - NOE 101
  - Non-covalent interaction 58
  - Nonspecific linker (NSL) 120
  - Notifying bodies 400
  - Nuclear magnetic resonance 99
  - Nucleation 278
- o**
- Oligonucleotide 63, 253
  - Opsonization 296, 298
  - Optical coherence tomography (OCT) 327
  - Optical reduction 385
  - Oriented nanostructure 78
- p**
- Pair correlation function 170
  - Palladium 122
  - Paramagnetic 234
  - Particle size separations 18
  - Particle shape 170
  - Passive targeting 300
  - Path development 191
  - Perfluorocarbon 234
  - Persistence length 276
  - Phage display (PD) 121
  - Phagocytosis 254, 296
  - Pharmogenetics 126
  - Phase retrieval 153
  - Photoelectron wave 173
  - Photolithography 67, 380, 385
  - Physicochemical properties 294
  - Pinocytosis 254, 297
  - Plasmapheresis 345
  - Plasmid 253
  - Polar group 259
  - Poloxamer 298
  - Poloxamine 298
  - Polyamidoamine 262
  - Polyamine 255
  - Polycarbonate membrane 73
  - Polysaccharides 76
  - Polyelectrolyte 58
  - Polyethylene glycol 261, 298, 349
  - Polyethylene oxide 298
  - Polyethylenimine 260
  - Polyethylcyanoacrylate 298
  - Polyisohexylcyanoacrylate 298
  - Polylactic acid 298, 300, 301, 349
  - Poly(lactic-co-glycolic acid) 297, 298, 302, 349
  - Polylysine 261
  - Polymethylmethacrylate 298

- Polypropylenimine dendrimer 262  
 Polyvinylpyrrolidone 298  
 Porod's law 170  
 Potential applications 20  
 Platinum 123  
 Precautionary principle 406  
 Pre-market approval 398  
 Protamines 265  
 Protein assisted assembly 63  
 Proteomics 126  
 Pulse sequence 234  
 Putrescine 254
- q**
- Quantitative analysis 176  
 Quantum dots 392  
 Quantum size effects 20  
 Quantum wires 20
- r**
- Radial distribution function 169, 180  
 Radiolytic synthesis 18  
 Radiotherapy 300, 301  
 Receptor mediated endocytosis 297, 306, 311, 314  
 Reciprocal lattice 146  
 Reducing agents 7  
 Relaxation 232  
 Relief structure 67  
 Reticulo endothelial system 294, 296, 299, 301, 306  
 Retrovirus 253  
 Ribosome display (RD) 121  
 Rietveld method 167  
 Rings of DNA 273  
 Rods of DNA 273
- s**
- SAXS – see Small-Angle X-ray scattering  
 Scanning probe microscopy 67  
 Scattering efficiency 330  
 Scattering amplitude 190  
 Scattering
  - anomalous 169
  - center 169
  - elastic 164, 188
  - factor 165
  - intensity 190
  - matrix 191
  - multiple 173
  - power 167
  - process 187, 188
  - vector 164
- Scherrer formula 167  
 Second quantization 187  
 Selection rules 190  
 Self-assembly 58, 120, 394  
 Self-organization 21, 60  
 Self-similar growth 65  
 Semiconductor nanowire based sensing 82  
 Side effects 291, 294–296, 299, 301, 306  
 Silica 123  
 Silicone 295, 298  
 Silver 123  
 Single-walled nanotubes, SWNT 40  
 Size selective separations 18  
 Size selective synthesis 18  
 Shape resonance 173, 174  
 Small-Angle X-ray scattering 169, 183, 189  
 Soft lithography 67  
 Sononchemical decomposition 17  
 Speciation 176  
 Spectral tenability 327  
 Spermidine 254  
 Spermine 254  
 Spores 370  
 Stabilizers 5  
 Standard methods 366  
 Steric stabilizations 5  
 Sticky fingers 395  
 Stokes-Einstein equation 269  
 Stroke 228  
 Substrate site selective growth 46  
 Superlattice 58  
 Superparamagnetic 233  
 Superstructures 58  
 Supramolecular assembly methods 20  
 Supramolecular polymerization 110  
 Surface enhanced RAMAN 131  
 Surface plasmon resonance 131  
 Surface receptors 355  
*Synechococcus* 120  
 Synthesis parameters 353  
 Synthesis of carbon nanotubes 43  
 SWNT strands 48
- t**
- Tapping mode 272  
 Targeted delivery 298, 299, 300–307  
 Taxol 291, 302  
 Template-assisted assembly 67  
 Template with relief structure 67  
 Thermolysis 17  
 Therapeutics 344  
 Threshold angle 169  
 Therapeutic cloning 410

- Titanium dioxide 371
- Tissue engineering 125
- Tissue factor 228
- Top-down methods 4
- Top-down microfabrication 67
- Toroids 256
- Toxicity 291, 295
- Toxin removal 343
- Total correlation spectroscopy (TOCSY) 99
- Transfection 259
- Triple helix stabilization 102
- Tris(2-aminoethyl)amine (TREN) 106
- Tumor tissue 292
- Tumor vasculature 292, 294, 296, 309
- Transmission electron microscopy 109, 274
  
- u**
- Unit cell
  - volume of 165, 166
  
- v**
- Valence states 174
- Van der Waals interaction 58
- Vascular endothelial factor 292, 297
  
- Vascular survival of nanoparticles 344
- Viral vectors 253
- Virus-assisted assembly 64
- Viruses 64, 369
- Vulnerable plaque 230
  
- w**
- White line 174
- Wet chemical preparations 4
  
- x**
- XANES 174, 177
- XAS – see X-ray absorption spectroscopy
- X-ray absorption spectroscopy 172, 190
- X-ray diffraction 164, 180, 188
  - assignment of lattice sites 166
  - resolving power 165, 167
  - peak indexing 165
- XRD – see X-ray diffraction
  
- z**
- Zeolites 123
- Zinc oxide 123
- Zinc sulfide 123