Index

A
Absorbance, 27, 39, 85, 157, 278, 280, 281, 310
Absorption cross section, 174, 175
Acetonitrile, 152, 153, 155
Activation energy, 207, 220, 227, 228, 236–238, 248–250
Adenine, 29, 277, 284, 285, 286, 288
Agglomerates, 61, 62, 64–66, 70, 137, 141
Aggregation, 36, 66, 83, 85–87, 89, 90, 135, 138, 146, 156, 269, 317
Alkoxysilanes, 312
Amino acid, 14, 39, 42, 186, 293, 327–337
Anatase nanocrystals, 364
Anderson localization, 190
Anderson localization for electrons, 256
Angular dependence of reflectivity, 125
Annihilation operator, 105, 106
APTMS, 312–317, 319, 320, 322
Aqueous solution, 11, 16, 38, 61, 63, 66, 70, 80, 181, 255, 277, 279, 287, 297
Arrhenius plots, 255, 228
Aspartic acid, 327, 335, 337
Attenuated total reflectance (ATR), 37–40, 43, 46, 119

B
BacMam, 341, 344, 345
Baculovirus expression vector system (BEVS), 341
Baculovirus nanoparticles, 346
Baculovirus surface display technology, 342
Bioactive glasses, 153–155
Biocompatible or bioactive materials, 8, 16, 136, 146, 156
Biomolecules, 8, 25, 36, 44, 327, 337
Bionanotechnology
Biopolymers, 3, 10, 288
Biosensing, 7, 74, 188
Biospecific interactions, 35–37, 42, 44, 46, 47
Bloch functions, 108
Boundary conditions, 52, 111, 278
Bragg reflection, 257
C
C_{60}, 217, 223, 232, 236–239
Cadmium alkanoate, 93
Carbon monoxide, 62, 148
Carrier concentration dependence of charge mobility, 213
Catalytic chemical vapor deposition, 62
Cavitation treatment, 63
8CB, 51–53, 56
CdSe quantum dots, 93, 94
Cetyltrimethylammoniumbromide (CTAB), 265
CH_{3}CN, 152, 153
Chelate
Chemical modification, 11, 312
Chemically-inert matrix, 166
Clay, 12, 264
CO, 145, 147–151
Complex metal oxides catalysts, 62
Complex Thy-graphene, 29, 32
Complex Thy-SWCNT, 29, 30, 33
Concept of strong local fields, 218

Conductive channel, 214, 217, 222, 234
Confocal images, 30
Confocal microscopy, 29, 255
Contrast ratio, 263
Creation operator, 106
Cubic, quadratic nonlinear optical response, 364
Cyclic adenosine monophosphate (cAMP), 339

D
Dark field, polymer laser
Defect, 51, 53, 56, 57, 256, 257, 260, 261, 253, 257, 258, 265
Defect arrays, 51
Defect resonant excitation, 357, 360, 365
Densification, 243–245, 249, 250
Densification kinetics, 249
Density-of-states (DOS), 206–209, 227, 234, 236–238
Density operator, 104
Dielectric constant (permittivity), 174, 222, 263–266, 269, 270, 273, 355
Dielectric spectra, 265, 266
Diffuse reflectance infrared Fourier transform, 37, 41
Directional fluorescence, 51
Disclination, 53
Dislocation, 57, 136
Dispersion equation, 103, 104, 111–114
Dispersions of carbon nanotubes, 62, 63, 65, 67, 266, 272
Distributed feedback (DFB), 189
DNA, 5, 25, 177, 183–185, 253, 255, 257–261, 276, 279, 280, 287, 293, 294, 341
2D nanostructures, 73
Drug delivery systems, 11, 12, 21
DTPA, 312–314, 316, 317, 319, 320, 322
Dyes, 4, 83–85, 175, 253
Dzeta-potential, TEM

E
EB-PVD method
EDTA, 296, 312–314, 316, 317, 319, 320, 322
Effective transport energy level, 206, 227, 238
Eigen problem, 108–110
Electric field dependence of charge mobility, 214, 216
Electrical conductivity, 145, 266
Electrochemical galvanostatic processes, 73, 74
Electrochemical intercalation, 73, 74, 76–78, 80
Electrochemistry
Electromagnetic wave, 104–107, 112, 146
Electrospray mass spectrometry, 327
Emin model, 328
Encapsulated nanopowders, 166
Energy back transfer, 311, 319, 321
Energy disorder, 238, 239
Energy transfer, 171–173, 175–177, 180, 186, 253, 261, 310, 311, 317, 319, 320, 322, 344
Enhancement factor, 25–29, 32, 33, 36, 39, 44, 46
Environmental toxicology
Erbium, 321
Europium, 319
Extended gaussian disorder model (EGDM), 206–208, 211, 212, 232

F
F2FlAsH and ReAsH, 344
Fano resonance, 179
Fermi level, 206, 209, 227, 232, 238
Film morphology, 218, 237
4f-luminescence, 310–312, 319–322
Fluorescence anisotropy, 342, 343
Fluorescence microscopy, 53, 56
Fluorescence quenching, 84, 173, 175, 177, 183, 185, 187, 188, 299
Fluorescent kinetics, 254, 257, 261
Fluorescent ligand binding, 341
Form factor, 109, 110
 Förster resonance energy transfer (FRET), 171, 344, 345
Fourier transform infrared spectroscopy (FTIR), 27, 35, 36–44, 46, 314, 316
Frederiks’s threshold, 266, 272
Fullerenes, 19
Functionalised gold nanoparticles, 37
**G**
- G protein-coupled receptors (GPCRs), 339–341, 344–346
- G proteins, 38, 339
- Gaussian disorder model (GDM), 207
- Gaussian distribution, 98
- Giant nonlinear optical response, 363, 364
- Gill relation, 229
- Global analysis, 346
- Glutamic acid, 335–337
- Gold nanoparticles, 10, 35, 37, 38, 40–44, 46, 47, 51, 53, 56, 175–177, 179, 180, 182, 185, 187, 189, 193
- Gold nanospheres, 40–43, 45, 46
- Goniometric setup, 119, 352
- Grain boundaries, 218
- Grain boundary diffusion, 249, 250
- Grain growth kinetics, 243, 246, 247
- Grain-boundary diffusion mechanism, 249, 250
- Graphene, 25–30, 32, 33, 73, 74, 75, 77, 78, 80, 81, 103–105, 107, 108, 111–114
- Graphene bilayer, 103, 104, 113
- Graphene oxide, 25–30, 33
- Graphene-like nanosheets, 73

**H**
- 2H-Nb1+ySe2, 73–78, 81
- H2O, 73, 74, 76, 77, 80, 145, 148, 150, 156–159, 255, 278
- Hapten sensing, 186, 187
- H-bond, 29, 30, 33, 156, 284–286, 335
- H-dimer, 86
- Health risk assessment, 3, 17, 21
- Heisenberg equation, 105
- High surface activity, 168
- Highest occupied molecular orbital (HOMO), 148, 149
- Histidine, 333–335, 337
- Homogenization, 63, 66
- Hopping charge-carrier transport, 205, 206, 208, 213, 223, 225, 228, 236
- Hybrid materials, 84, 312, 314, 316, 317
- Hybrid micelles, 90
- Hydrodynamic properties, 298
- Hydrogen bond redistribution, 363, 364
- Hydrostatic pressure, 140–142
- Hydroxyapatite (HA), 156–159
- Hydroxycarbonate apatite (HCA), 153
- Hypochromic coefficient, 280, 283
- Hypochromic effect, 276, 280, 282, 288
- Hypoxanthine, 281, 282, 284–287
- 2H-TaS2 structural type, 73, 74, 76, 78, 80, 81

**I**
- Immunoglobulin, 38, 40, 43, 185, 187
- Immunosensor, 186
- Infrared spectroscopy, 33, 148, 156
- Inorganic graphene-like nanoparticles, 73
- In-situ IR spectroscopy, 145, 147, 148, 156
- Interaction energy, 285, 286, 288
- Intercalation compounds, 73, 76
- Intermolecular interactions, 85, 158, 327
- Internal self-focusing, 360, 363, 364
- Ion sensing, 188
- Ionic liquid crystal, 94
- Ionic smectic glass, 94
- Isokinetic temperature, 226, 232

**J**
- J-dimer, 87

**K**
- KDP, KH2PO4, 349
- Kretschmann configuration, 192

**L**
- Lack of compensation the charge of the particle surface, 168
- Lanthanides, 322
- Laponite (Lap), 263–265, 269, 271–273
- Large-carrier-concentration transport regime, 208, 223
- Laser beam self-action, 356–357
- Lateral electric field, 211, 217, 218, 220, 222, 223, 227
- Layered d-transition metal dichalcogenides, 73, 80
- Life-time, 261
- Light localization, 253, 260
- Liquid crystals (LCs), 51–53, 57, 93, 263, 265
- Local heating, 96
- Localized states, 205, 206, 209, 238
- Localized surface plasmon, 51
- Lowest unoccupied molecular orbital (LUMO), 148, 149
- Luminescence, 83, 185, 255, 260, 310, 312, 320
- Luminescence lifetime
M
Matrix defects, 358
Mechanisms of growth, 135
Melanocortine Receptors, 341, 344
Mesoscopic approach, 135, 136
Mesostructured, 83, 84, 86, 90
Metal oxide nanoparticles, 7, 18, 171, 173, 176, 178, 180, 185, 186, 190
Metallized prism, 127
Method to produce a stable suspension, 165, 169
Meyer-Neldel rule (MNR), 207
Microscopic imaging, 253
Microwave sintering, 243, 245–250
Miller-Abrahams (MA) jump rate, 209
Molecular dynamics, 14, 275, 276, 278, 287, 288, 329, 332, 337
Molecular dynamics simulation, 278, 284, 327, 328, 331, 332, 336, 337
Molecular self-assembly, 5, 14
Molecular structure
Molecular tools, 145
Montmorillonite (MMT), 12, 264
Multiexcitation entropy (MEE) model, 236
Multiple scattering, 259
Multiscale engineering, 16
Multiscale system models, 21

N
N-acetyl-D-glucosamine, 45
Nanobiocomposite hazard assessment, 18, 19, 20
Nanobiocomposite synthesis, 4, 10, 13
Nanobiocomposites, 3, 4, 6, 10, 11, 13
Nanocomposite functional material, 10
Nanocomposites, 3, 6, 10–13, 15, 17, 93, 94, 100, 314, 327
Nano-crystalline materials, 19
Nanomaterial risk analysis, 17
Nanomaterial toxicology, 18
Nanomaterials, 3, 4, 6, 17–19, 21, 74, 145–147, 310, 337
Nanoparticle plasmon resonance, 172, 183
Nanoparticles (NPs), 145, 349
Nanopowder, 75, 136–138, 142, 166, 167, 169
Nanosheets, 33, 73, 74
Nanosize TiN powder, 244
Nanosized capacitor, 363, 364
Nanostructured ceramics, 136
Nanostructures, 5, 7, 36, 74, 78, 81, 171, 173, 176, 178, 185, 190
Nanotechnology, 3–5, 19, 21, 61, 145, 146
Nanotechnology risk assessment, 17, 21
Narrow dispersion particles, 165
Natural clay, 264
Neodymium
Nonlinear absorption, 93, 94, 100, 354
Nonlinear polarizability
Nonlinear refraction, 100
Nonlinear response, 93, 98, 100, 355
Nonradiative losses, 176, 355, 362, 363
Nonradiative rate, 172, 173, 175–177
Nucleic acids, 3, 291
Numerical computer simulations of charge transport, 206, 211, 212

O
Occupation number, 27, 105, 107
Occupational density-of-states (ODOS), 206, 232
Oily streak, 51–53, 55–57
Oligonucleotide sensing, 183
Oligonucleotides, 183, 186, 278, 291–300, 302
Optical constant, 89
Optical scattering losses, 350
Organic field-effect transistor (OFET), 205, 207, 211, 212, 214, 217–220, 222, 229, 232, 236
Organic nanoparticles, 156, 327
Organic polymer, 10, 15, 288, 317
Organic semiconductors, 179, 189
Organic-inorganic materials, 312, 319
Organic-inorganic nanostructures, 165, 166
Organomodified laponite (LapO), 263, 265
Oriented attachment, 135, 138, 139
Otto scheme, 122
Oxide nanoparticle system, 135
Oxygen-vacancy sewing consolidation, 135, 140

P
Particles size, 61, 66, 70, 78
Percolation phenomena, 266
Phase speed, 103, 104, 112–114, 355
Phosphorescence, 310, 317
Photogenerated electrons, 363, 364
Photoinduced thin lens, 98
Photoluminescence, 53, 84, 147, 189, 254, 257
Photonic crystal, 255, 261
Plasma frequency, 33
Thymine (Thy), 26
Tight-binding approximation, 114
Time of thermal diffusion, 99
Tissue regeneration systems, 9
Tissue repair, 8, 10, 11
Transfer matrix method, 123
Trapping, 51, 53, 57
Two-photon absorption, 352, 362
Tyndall effect, 167

U
Ultrasound treatment, 67
UV-vis spectroscopy, 147
UV-visible absorption spectroscopy, 83, 278

V
Valine, 327, 332, 333, 337
Van der Waals forces, 62, 75, 78
Vapor phase, 157
Vertex model, 62
Vibration modes, 28, 156
Volume particles distribution
  by dimensions, 167

W
Water-soluble polymer and ionic surfactant
  system/CNTs, 61, 69, 70
WGA, 44, 46
Wheat germ agglutinin, 44

X
X-ray diffraction, 75
X-Ray powder diffraction, 160

Y
Ytterbium, 322

Z
zeta potential, 168
zirconia nanoparticles, 137, 138, 142
zirconia property, 135
ZrO₂, 135, 140, 141
Z-scan technique, 93