

## Index

### **a**

Alzheimer's disease 90, 149  
Arabia 121

### **b**

biocompatibility 170  
bio-imaging 85  
biolabels 35  
biosensing process  
  biological recognition 147  
  cancer biomarkers 148  
  LSPR dependence 148  
bone regeneration materials  
  41  
Brust–Schiffirin method 192

### **c**

calcium 68  
catalytic motors 55  
ceria nanoparticles 231  
cerium oxide nanoparticles 216  
chemical reduction methods 192  
China 121  
cobalt 68  
cobalt–chromium–molybdenum  
  (CoCrMo) alloy 228  
conventional chemotherapy 38  
conventional gene transfer techniques  
  39  
copper nanoparticles  
  anti-bacterials activity 180  
  anti-cancer activity 180

drug carrier 182  
molecular imaging 181  
synthesis 180  
copper oxide nanoparticles 216

### **d**

Debye–Hückel law 49  
density dependent phase continuum  
  model 49  
Derjaguin–Landau–Verwey–Overbeek's  
  (DLVO) theory 49  
diabetes 92  
DNA-gold nanoparticle (AuNPs) 36  
drug delivery  
  AuNPs 74  
  fabricated porous ZnO nanorods 77  
  mesoporous silica nanoparticles  
    (MSNPs) 77  
  multidrug resistance (MDR) 78  
  palladium nanoparticles (PdNPs) 76  
  passive targeting and active targeting  
    73  
  photosensitizers (PS) loaded  
    nanoparticles 77  
  transition metal nanoparticles 76

### **e**

electrochemical biosensors 150  
enhanced permeability and retention  
  effect (EPR) 38  
epidermal growth factor receptor  
  (EGFR) 136

**f**

- fluorescence intensity 134
- fluorescence resonance energy transfer (FRET) 150
- fluorescence spectroscopy 150
- Functionalized gold nanoparticles 136

**g**

- gadolinium nanoparticles 86
- Gibbsite-phosphomolybdate composite 50
- gold 121
- gold nanoparticles (GNPs) 131, 135, 137, 143, 147, 203, 210
  - biomedical application 172
  - in cancer imaging 175
  - gene delivery 175
  - plasmonic photothermal therapy 172
  - platinum-tethered nanoparticles 175
  - therapeutic agent 173
  - toxicity 229
- gold nanorods 147
- green synthesis method 193

**h**

- Hodgkin's lymphoma 229
- Huntington's disease 90
- hydrophobicity 221
- hyperthermal therapy 139
- hyperthermia treatment (HTT) 81, 139

**i**

- immunosensor array 179
- India 121
- interferometric reflectance imaging sensor (IRIS) 36
- iron oxide nanoparticles (SPIONs) 170
- irradiation 192

**l**

- lactate dehydrogenase (LDH) 142
- laser ablation techniques 192
- localized surface plasmonic resonance (LSPRs) 131, 132

- properties 33
- localized surface plasmons (LSPs) 128

**m**

- magnetic resonance imaging (MRI) 37, 145
- mesoporous silica nanoparticles (MSNPs) 77
- metal complexes
  - in chemistry 1
  - in medicine 2
- metal depletion 142
- metallic copper nanoparticles 142
- metalloproteins 68
- metal nanoparticles
  - advantages
    - biocompatibility 170
    - luminescence property 170
    - metabolic pathways 170
    - stability and homogeneity 169
  - in ancient India and Egypt 121
  - anticancer agents 171
  - antimicrobial and wound healing effects 141
  - clinical diagnostics
    - biosensing 147
    - colloidal gold particles 122
    - computed tomography (X-ray CT) 146
    - MRI 145
  - copper formulations 121
  - copper nanoparticles
    - anti-bacterials activity 180
    - anti-cancer activity 180
    - drug carrier 182
    - molecular imaging 181
    - synthesis 180
  - gold 121
  - gold nanoparticles (GNPs)
    - biomedical application 172
    - in cancer imaging 175
    - gene delivery 175
    - plasmonic photothermal therapy 172
    - platinum-tethered nanoparticles 175
    - silver nanoparticles 215

- therapeutic agent 173
- inertness, biocompatibility, surface modifications 126, 127
- internalization and biodistribution
  - blood and/or lymphatic system 204
  - physico-chemical properties 205
- iron oxide nanoparticles toxicity 228
- medicinal applications
  - anti-angiogenic therapy 82, 83
  - anti-cancer activities 80
  - anti-inflammatory effects 93
  - anti-microbial activity 88
  - in bio-imaging 85
  - biosensing applications 86
  - biosynthesized nanoparticles 94, 95
  - cardiovascular related diseases 71
  - chemotherapeutic agents 70
  - in clinical study 97
  - colloidal gold 69
  - copper and zinc 70
  - in diabetes 92
  - drug delivery 73, 78
  - future aspects 98
  - Indian ayurvedic medicine 69
  - melting temperature 240
  - and nanomedicine 122
  - nanomedicine approach 70
  - neurodegenerative diseases 90
  - neurodegenerative disorders 71
  - nucleic acid delivery 78, 79
  - pharmacokinetics 95, 97
  - pro-angiogenic properties 83
  - retinal disorder 93
  - therapeutic and diagnostic nanomedicine approaches 68
  - in tissue engineering 92
- nanosystem
  - nanoscale dimensions 124
  - shape and morphology dependence 125
- optical properties 132
  - of gold 239, 240
- photothermal and photodynamic therapies and cancer treatment 139
- platinum nanoparticle 230
- silver nanoparticles (Ag NPs)
  - biological methods 176
  - in breast cancer 177
  - cellular imaging and clinic diagnostics 179
  - chemical methods 176
  - in colorectal cancer 178
  - synthesis, and fabrication techniques 125, 126
  - targeted drug delivery and controlled release 135
- toxicity
  - blood–brain barrier 204
  - cardiovascular diseases 233
  - catalytic activity 222
  - by cells 231, 233
  - central nervous system interaction 236
  - cerium oxide nanoparticles 216
  - cobalt and nickel compounds nanoparticles toxicity 228
  - copper oxide nanoparticles 216
  - crystalline structure dependent toxicity 221
  - diamagnetic materials 223
  - environmental pollution 205
  - external magnetic field 226
  - ferromagnetic materials 226
  - gold nanoparticles 229
  - hydrophobicity and hydrophilicity 221
  - inhaled nanoparticles 204
  - iron oxide nanoparticles toxicity 228
  - liver, kidneys and organ interaction 237
  - macrophage phagocytosis 205
  - metal dust and welding fume 213 and morphology 217, 218 and morphology dependent toxicity 218
  - nanoparticles composition 210

- nanoparticle size 215
  - nanoparticle size dependent
    - toxicity 207, 210
  - and nanoparticle surface 221
  - paramagnetic materials 223
  - platinum nanoparticle 229
  - protein corona, formation of 230
  - residence time 205
  - silver nanoparticles 215
  - superparamagnetic nanoparticles 226
  - surface charge dependent toxicity 223
  - surface functionalization
    - dependent toxicity 222
  - titanium dioxide nanoparticles 215
  - ZnO nanoparticles 216
  - microptomechanical movement (MOM) 56
  - multidrug resistance (MDR) 78
- n**
- nanobiosensors 36
  - nanomedicine
    - advanced drug delivery 38
    - antimicrobial essential oils (EOs) 43
    - biolabels 35
    - bone regeneration materials 41
    - cell therapy 43
    - in dentistry 42
    - LSPR properties 33
    - metal nanoparticles 34
    - nanobiosensing 36
    - nanomedicinal applications 34
    - nanoparticles-mediated gene transfer methods 39
    - protein detection and analysis 35
    - regenerative therapies
      - tissue engineering and implants 41
    - in vivo* imaging 37
  - nanoparticles 7
    - development 5
    - features 4
    - liposome-based nanoparticles 5
    - metal nanoparticles 5
    - polymeric nanoparticles 5
    - in science and medicine 6, 7
    - transition metal nanoparticles
      - synthesis 4
  - nanotechnology 2, 7
    - definition 2
    - development 2
    - in medicine 3, 4
  - neurodegenerative diseases 90
  - nickel compounds 228
  - noble metal nanoparticles (NMNp)
    - antibacterial nano-materials and antibacterial mechanism 193
    - chemical method 192
    - cytotoxic mechanism 195
    - green synthesis method 193
    - physical methods 191
    - reactive oxygen species mechanism 195
- o**
- one phase reduction methods 192
  - oxidative stress 195
- p**
- photothermal effects 137, 139
  - photothermal therapy (PTT) 139
  - plasmon-enhanced fluorescence (PEF) 150
  - plasmonic nanoparticles 139
  - plasmonic photothermal therapy (PPTT) 172
  - Platinum nanoparticles 34, 229
  - Platinum nanoparticles stabilized with polyacrylate (PAA-Pt) 230
  - prostate-specific membrane antigen (PSMA) 136
- q**
- quantum size effects 206
- r**
- radio-frequency (RF) range 145
  - radiofrequency ablation (RFA) technique 141
  - Raman scattering intensity 133

- recombinant DNA technology (rDNA)  
39
- regenerative therapies  
tissue engineering and implants 41
- retinal disorder 93
- S**
- silver nanoparticles (Ag NPs) 135, 142,  
143  
biological methods 176  
in breast cancer 177  
cellular imaging and clinic diagnostics  
179  
chemical methods 176  
in colorectal cancer 178  
cytotoxicity 179  
drug carrier 178  
in hepatocellular carcinoma 178  
in lung cancer 177  
in medical utilization 178
- sodium borohydride 192
- soft-oxometalates (SOMs)  
active nano/micro motors  
catalytic motors 55  
electric field 56  
lights 56  
magnetic field 55  
ultrasonic energy 56  
in catalysis 52  
control of morphology 51, 52  
Debye–Hückel law 49  
Derjaguin–Landau–Verwey–  
Overbeek’s (DLVO) theory 49  
designed soft-oxometalates 50  
heptamolybdate SOMs 58, 60  
microptomechanical movement  
(MOM) 56  
in patterning 52, 55  
POMs self-assembly 49  
spontaneously formed SOMs 50  
water oxidation catalysts 60  
superparamagnetic iron oxide (SPIO)  
nanoparticles 43, 86  
superparamagnetic nanoparticles  
146  
surface enhanced fluorescence (SEF)  
134  
surface plasmon resonance (SPR) 35  
surface plasmons 128
- t**
- tissue engineering 92  
and implants 41  
titanium dioxide nanoparticles 216  
Transferrin 137  
two-photon photoluminescence (TPPL)  
134
- u**
- UV irradiation 51
- v**
- vascular endothelial growth factor  
(VEGF) 165 82
- x**
- X-ray attenuation 147
- z**
- zinc 68











