

Index

a

- accumulative roll-bonding (ARB) 46
- adoptive cell transfer (ACT) 314
- adult stem cells 86
- alendronate-loaded
 - hydroxyapatite-TiO₂ nanotube 228
- alkanethiol based SAM 194
- allograft 9
- aminopropyltrimethoxsilane (APTMS) 360
- amperometric sensors 87
- amphiphilic peptides 115
- amphotericin B (AmB) 16
- amyloid fibrils 112
- application of functionalized carbon nanotubes 128, 129
- application of functionalized graphene 127, 128
- atomic force microscopy (AFM) 109
- autograft 9

b

- barium 260
- basic fibroblast growth factor (bFGF) 17
- β-cyclodextrin-QSY-9 dye conjugate 21
- β1 integrin/MAPK pathway 78
- β-sheet forming peptides 112, 114
- beta titanium alloys 47
- bilayer phospholipid fragments (BPFs) 120
- biocompatibility 466

- biocompatible nanoparticles/nanofillers 66
- biodegradable electronics
 - conventional biodegradable materials 248
 - dielectric materials 249
 - biodegradable polymers 122, 147
 - biofunctional nanofibers 78
 - biomedical imaging 464
 - CNTs 95
 - graphene 95, 97
 - biomimetic laminin 12
 - biopolymers 147
 - biosensing
 - CNTs 93, 94
 - graphene 94, 95
 - biosensors 87
 - biodegradable electronics
 - conventional biodegradable materials 248
 - dielectric materials 249
 - passive and active electrode arrays 252
 - reactive diffusion, 1D model of 248
 - resorbable electronic stent 250
 - traditional photolithography techniques 250
 - transfer printing process 251
 - definition 241
 - injectable electronics 246
 - optical biosensors 241
 - soft electronics
 - field-effect transistors (FET) 244

- biosensors (*contd.*)
- inorganic light-emitting diodes (ILEDs) 244
 - silicon metal oxide semiconductor field-effect transistors (MOSFET) 244
 - silk substrates 245
 - stretchable biosensors 245
 - transfer printing process 242, 243
 - ultrathin device 245
- Utah intracortical electrode arrays 242
- biosensors and bioreactors 175
- block copolymers (BCPs) 201
- bone-forming peptide 1 (BFP1) 71
- bone marrow-derived hematopoietic stem cells (BMHSCs) 70
- bone morphogenetic protein-2 (BMP-2) 230
- bone regeneration 294
- bone tissue engineering 13, 15, 75, 77
- CNTs 90, 92
 - electrospinning 152
 - graphene 92
- C**
- calcium phosphate (CaP) based composite materials 76
- camptothecin (CPT) 16, 413
- cancer therapy
- angiogenesis and angiogenic switch 307
 - carbon nanotubes 319
 - cell growth and division 306
 - characteristics 306
 - chemotherapy 311
 - clinical methods 305
 - dendritic polymers
 - chemical dendritic polymer-drug conjugates 411, 413
 - CT imaging applications 408
 - dendrons and dendrimers 404
 - drug delivery systems 410
 - enhanced permeability and retention (EPR) effect 404
 - molecular imaging (MI) techniques 404, 408
- optical imaging technology 409
- poly(amidoamine) (PAMAM)
- dendrimers 404
 - polysorbate functionalized dendrimers 410
- precise molecular structures 413
- safe imaging probes 403
- theranostics 414, 420
- enhanced permeability and retention (EPR) effect 305, 309
- extracellular pH cancer cells 306
- gene therapy 313
- gene therapy and immunotherapy 305
- immunotherapy 314
- inorganic NPs 318
- liposomes 316
- NBMs-based nanovectors 315
- organic biomaterials and inorganic materials 306
- photodynamic therapy (PDT) 313
- Polymeric NPs 315
- QDs 317
- radiotherapy 312
- surgery 311
- treatment options 310
- tumor microenvironment 307
- carbon based nanobiomaterials 15, 17
- carbon-based nanomaterials
- cell membrane, integrity of 433
 - cytotoxicity 432
 - dichlorofluorescein (DCF) assay 433
 - genotoxicity 434
 - in vitro assays 432
 - intracellular ROS production 433
 - lactate dehydrogenase (LDH) assay 433
 - MTT assay 432
 - single cell gel electrophoresis (SCGE) assay 434
- carbon nanotubes (CNTs) 125
- biomedical imaging 95
 - biosensing 93, 94
 - bone tissue engineering 90, 92
 - CNT-based NCs 448
 - delivery systems 92, 93
 - intrinsic optical properties 87

- in vitro biosafety 435
 in vivo biosafety 437
 neural tissue engineering 88, 89
 types and structures 434
 carbon nanotubes/nanofibers
 (CNTs/CNFs) 14
 cartilage tissue engineering 12, 13
 cationic peptide surfactants 118
 cell tracking 346
 cellularized nanofiber hydrogel
 composites 73
 centrifugation 172
 chemical patterning 192, 196
 chemotherapy 311
 chitosan-heparin nanoparticles 11
 chlorotoxin (CTX) 22
 circular dichroism (CD) spectroscopy
 110
 clinical trials, nanobiomaterials
 gold nanoparticles nanobiomaterials
 464
 iron oxide nanobiomaterials 464
 liposomes 460
 PEG coated nanobiomaterials 462
 polymeric nanoparticles 463
 quantum dots (QD) 466
 silver nanoparticles 465
 tissue engineering scaffold 467
 CNT based nanobiomaterials 23, 24
 coiled-coil peptides 114
 collagen 88
 collagen-like triple-helical peptides
 114, 115
 collagen-SWCNT 89
 colloidal lithography 200
 combinatorial patterning 200, 201
 commercially pure titanium (CP-Ti) 58
 confocal microscopy 110
 copolymers 148
 co-precipitation method 330
 Cornell dot (C-dot) nanobiomaterials
 466
 critical micelle concentration (CMC)
 122
 cyclic peptides 113
 Cyclodextran 265
 cytotoxic effects 440
- d**
- decellularized extracellular matrix
 (dECM) based hybrid systems
 74
 delivery systems
 CNTs 92, 93
 graphene 93
 dendritic polymers, cancer diagnosis
 and therapy
 chemical dendritic polymer-drug
 conjugates 411, 413
 CT imaging applications 408
 dendrons and dendrimers 404
 drug delivery systems 410
 enhanced permeability and retention
 (EPR) effect 404
 molecular imaging (MI) techniques
 404, 408
 optical imaging technology 409
 poly(amidoamine) (PAMAM)
 dendrimers 404
 polysorbate functionalized
 dendrimers 410
 precise molecular structures 413
 safe imaging probes 403
 theranostics 414, 420
 Derjaguin, Landau, Verwey, Overbeek
 (DLVO) theory 108
 dip assembly 169
 disintegrated melt deposition (DMD)
 47
 doxorubicin (DOX) 17, 175, 419
 doxorubicin/gelatin-GNS compound
 17
 drug delivery strategies 123
 dual-modal fluorescent-magnetic
 nanoparticles 19
 dynamic light scattering (DLS) 110
- e**
- electric and magnetic LbL assembly
 171
 electrochemical anodization
 alumina pore formation 215
 description 213
 field-enhanced dissolution 216
 mechanism of oxide formation 214

- electrochemical anodization (*contd.*)
 nanotubular arrays *see* nanotubular arrays
 self-aligned nanotubular structure 213
 self-organized nanoporous alumina layers 216
 TiO_2 nanotubes *see* TiO_2 nanotubes
 water soluble metal-fluoride complexes 216
- electrochemical DNA biosensors 95
- electrochemical method 361
- electrochemical sensors 87
- electrocorticography (ECoG) 245
- electrohydrodynamic (EHD) technique 143
- electron microscope (EM) 109
- electrophoresis 173, 174
- electrophoretic polymer assembly 174
- electrospinning 287
- advances in the collector 146
 - advances in the spinneret 146
 - applied voltage 150
 - biodegradable polymers 147
 - biopolymers 147
 - bone tissue engineering 152
 - conductivity 150
 - copolymers 148
 - description 143
 - device 144, 145
 - distance from spinnerette to collector 150
 - future directions 159
 - humidity 151
 - melt-electrospinnable polymers 148
 - molecular weight 149
 - nerve tissue engineering 153
 - organosoluble polymers 147
 - process 144
 - skin tissue engineering 154, 155
 - solution concentration 149
 - solution feeding rate 150
 - solution viscosity 148
 - surface tension 149
 - temperature 151
- tendon and ligament tissue engineering 155, 156
- transport and release of drugs 156, 157
- vascular tissue engineering 152
- water-soluble polymers 147
- electrospinning approach 295
- electrospinning technique 68
- electrospun PLLA/d-HAp nanocomposite 76
- embryonic stem cells (ESCs) 86
- enhanced permeability and retention (EPR) effect 264, 309, 404
- enzyme-based sensors 95
- epidermal growth factor receptor antibody 270
- equal channel angular pressing 43–45
- ethosuximide (ESM) 18
- extracellular matrix (ECM) 7, 66
- extracellular microenvironment
- biomimetic features and physiochemical properties 284
 - bone regeneration 294
 - heart regeneration 295
 - nanocomposite biomaterials 288
 - nanofibrous scaffolds 286
 - nanoparticles and nanoclusters 284
 - nanotopography, role of 282
 - therapeutic benefits 284
- f**
- fetal bovine chondrocytes (FBC) 13
- field-effect transistors (FET) 244
- fluidic LbL assembly 170, 172
- folate receptors (FR) 409
- Fr^α receptor 270
- g**
- gadolinium (Gd) 262
- gadolinium
- diethylenetriaminopentaacetic acid (Gd-DTPA) 337
- gadolinium-conjugated gold nanoshells 368
- gene therapy 313
- glucose oxidase (GO) 175
- gold nanobiomaterials 22, 23

- gold nanoparticles (AuNPs) 408, 464
 biomedical applications 359
 enhanced permeability and retention (EPR) 359
 gold nanocages 362
 gold nanocluster 362
 gold nanorods 361
 gold nanoshells 360
 multi-mode imaging technology
 dark-field and SERS imaging 367
 fluorescence and SERS imaging 368
 OCT imaging 364
 photoacoustic imaging 364
 photothermal tumor therapy 359
 SERS detection and imaging 365
 silica nanorattles (SNs) 360
 surface plasma resonance (SPR)
 properties 359
 theranostics integration platform 368, 371, 374
 gold nanoshells (GSNs) 22, 360
 gold quantum clusters (QCs) 22
 G protein-coupled receptors (GPCRs) 20
 gradient nanofibers 74, 75
 graphene 124, 125
 biomedical imaging 95, 97
 biosensing 94, 95
 bone tissue engineering 92
 definition 439
 delivery systems 93
 graphene-based NCs 448
 graphene derivatives 440
 in vitro biosafety 440
 in vivo biosafety 443
 neural tissue engineering 89
 photoluminescence 87
 graphene-iridium oxide (IrOx) hybrid material 89
 graphene nanosheets (GNS) 17
 graphene-peptide hybrids 126, 127
 graphene quantum dots (GQDs) 367
- h***
 heart regeneration 295
 high pressure torsion (HPT) 45, 46
- human adipose-derived stem cells (hADSCs) 74
 hybrid nanofibers 72, 74
 hydride-terminated silicon nanocrystals 386
 hydrogel(s) 289
 hydrogel nanofiber hybrid scaffolds 72
 hydrogen silsesquioxane (HSQ) 386
 hydrosilylation 383, 386
 hydroxyapatite (HA)
 formation 223, 224
 nanoparticles 12, 286
 hyperthermia 340
- i***
 immediate bone-implant contact 212
 immersive LBL assembly 169
 immunosensors 95
 immunotherapy 314
 impedimetric sensors 87
 implantable biomaterials 211
 indodicarbocyanine dye (IDCC) 420
 induced pluripotent stem cells (iPSCs) 86
 inductively coupled plasma mass spectrometer (ICP-MS) 371
 inorganic light-emitting diodes (ILEDs) 244
 inorganic nanobiomaterials 124
 application of functionalized carbon nanotubes 128, 129
 graphene 127, 128
 carbon nanotubes 125
 graphene 124, 125
 graphene-peptide hybrids 126, 127
 layer-by-layer assembly 127
 surface functionalization of carbon nanotubes 128
 graphene 126
 interferon- α 314
 interleukin-2 314
 iodine 260
 ionic-complementary peptide EAK16-II 113
 ionic self-complementary peptides 115
 iron nanoclusters 286
 iron oxide nanobiomaterials 464

- iron oxide nanoparticles (IONPs)
 biomedical application
 magnetic hyperthermia 340
 magnetically controlled drug delivery 343
 magnetically controlled gene delivery 344
 MR imaging (T1/T2) 337
 cell tracking 346
 chemical approach 330
 co-precipitation method 330
 hydrothermal synthesis 333
 magnetic resonance imaging (MRI)
 contrast agents 329
 microemulsion 334
 polyol synthetic process 335
 size-dependent magnetic property 329
 sol-gel method 334
 thermal decomposition 331
 tissue engineering 345
- I**
- lactate dehydrogenase (LDH) assay 433
 layer-by-layer (LbL) assembly 127
 biological stimuli-responsive cargo release
 enzymes 177
 pH 178
 redox 178, 179
 biosensors and bioreactors 175
 cargo loading
 capsule shells 176
 post-loading 176
 pre-loading cargoes 176
 centrifugation 172
 covalent bonding 168, 169
 definition 165, 166
 electric and magnetic 171
 electrophoresis 173, 174
 electrostatic bonding 167
 fluidic 170, 172
 hydrogen bonding 168
 immersive 169
 mechanical effects 181, 182
 microfluidics 174
- morphology effects 179, 180
 spin 169, 171
 spray 171
 surface property 180, 181
 therapeutic delivery 174
 LbL polyelectrolyte shell 165
 liposomal nanobiomaterials
 anticancer agent 460
 chemotherapeutic drugs 461
 clinical applications and trials 462
 hydrophilic/hydrophobic payloads 462
 liposomes 119, 121, 316
 liquid filled nanoparticles (LFNPs) 16
 low density lipoprotein (LDL) 123
 lysozyme 112
- m**
- magnetic field manipulation 286
 magnetic hyperthermia 340
 magnetic nanoparticles (MNPs) 21, 285, 407
 magnetic resonance imaging (MRI) 261
 magneto fluorescent nanoparticles (MFNPs) 22
 mammary-derived growth inhibitor (MDGI) expressing tumors 386
 matrix metalloproteases (MMPs) 309
 melt-electrospinnable polymers 148
 mesenchymal stem cells (MSCs) 87
 mesoporous silica nanoparticles 379
 metallic nanomaterials
 biocompatibility 57, 59
 biological environment 51, 52
 biomedical application 59
 corrosion behaviour 42, 53
 corrosion mechanism 50
 future aspects 59
 mechanical behavior 48, 49
 passivation 50, 51
 severe plastic deformation
 accumulative roll-bonding 46
 disintegrated melt deposition 47
 equal channel angular pressing 43–45
 high pressure torsion 45, 46

- multi-pass caliber rolling (MPCR) 47
 ultrafine grained materials 40–43
 wear 54, 57
 metal oxide semiconductor field-effect transistors (MOSFET) 244
 metastatic cancer 369
 methotrexate (MTX) 410
 Michael addition/amidation reactions 417
 micrococcal nuclease (MNase) 20
 microemulsion 334
 microfluidics 174
 microtubule-associated protein 2 (MAP-2) 78
 molecular dynamics (MD) simulation 249
 molecular imaging (MI)
 biomaterial packing
 biotin –avidin system 266
 DOTA based metal chelators 266
 enhanced permeation and retention (EPR) 264
 glucose consumption 264
 hydrophilic biomaterials 266
 liposomes 266
 osmotic pressure 266
 polyethylene glycol 264
 polymeric nanoparticle MRI image 266
 PET 259
 reporter nano-biomaterial system
 clinical application 260
 CT techniques 260
 emission characteristics 262
 imaging agents 262
 imaging modalities 261
 metal reporter molecules 262
 MRI 261
 optical imaging 262
 PET tracer 260
 ultrasound 262
 targeting ligands and molecular imaging
 and binding constants 268
 cell tracking and regenerative medicine 271
 cRGD 270
 cyclic RGD peptide 270
 folic acid 270
 Fr α receptor 268
 ICAM and VCAM 271
 labeled immune cells 272
 multimodal imaging 271
 passive targeting 268
 perfusion imaging 268
 somatostatin 270
 Traztuzumab 270
 techniques 404, 408
 2-deoxyglucose (2-DG) 259
 molecular self-assembly
 atomic force microscopy 109
 circular dichroism spectroscopy 110
 confocal microscopy 110
 description 107
 dynamic light scattering 110
 electron microscope 109
 nano-drug carriers *see* nano-drug carriers
 nanoscale interactions 107, 108
 Raman spectroscopy 111
 scanning tunneling microscopy 110
 self-assembling peptides *see* self-assembling peptides
 X-ray diffraction 111
 motional averaging regime 338
 MTT assay 432
 multidrug resistance (MDR) 315
 multi-mode imaging technology
 dark-field and SERS imaging 367
 multi-pass caliber rolling 47
 multi-walled carbon nanotubes (MWCNTs) 11, 85
 myocardial infarction (MI) 295
- n**
- nanobiomaterial
 absolute efficiency of 4
 biocompatibility and toxicity 5, 6
 bone tissue engineering 13, 15
 carbon based nanobiomaterials 15, 17
 cartilage tissue engineering 12, 13
 definition 3

- nanobiomaterial (*contd.*)
- imaging and biosensing applications
 - CNT based nanobiomaterials 23, 24
 - gold nanobiomaterials 22, 23
 - magnetic nanoparticles 21
 - organic-inorganic based materials 23
 - polymer based nanobiomaterials 19
 - quantum dots 19, 21
 - interaction with biological system 4, 5
 - neural tissue engineering 9, 12
 - polymer based nanomaterials 18
 - properties 4
 - safety and toxicity of 3
 - silica nanoparticles 17, 18
 - vascular tissue engineering 7
 - nano-biopatterning 190, 192
 - nanocomposites
 - hepatic cells 290
 - hydrogels 289
 - nanoES scaffold 290
 - porous and fibrous nanocomposite scaffolds 290
 - nanocrystalline (NC)/ultra fine grained (UFG) metallic materials 49
 - nano-drug carriers 118
 - applications 124
 - drug delivery strategies 123
 - drug loading capacity 119
 - inorganic nanobiomaterials *see* inorganic nanobiomaterials
 - liposomes 119, 121
 - PEGylation 121
 - poly(lactic-co-glycolic) acid (PLGA) 121
 - polymeric micelles 122, 123
 - schematic examples of 119
 - triggered drug release 123, 124
 - nanofiber-enabled encapsulation device 73
 - nanofibers and hydrogel 115, 117
 - nanofibrous scaffolds
 - bioactivity 288
 - blended scaffolds 288
 - cellular growth and function 288
 - electrospinning 287
 - natural and synthetic material 288
 - phase separation 287
 - self-assembly 287
 - synthetic polymers 288
 - template synthesis 286
 - 3D bioprinting 287
 - nano-HA/PVA gel composite scaffold 12
 - Nanoimplants 59
 - nano imprint lithography (NIL) 197
 - nanomedicines 459
 - nanoparticles (NPs) 284
 - nanopatterning
 - biomedical applications 204
 - chemical patterning 192, 196
 - combinatorial patterning 200, 201
 - factors influencing 202, 204
 - nano-biopatterning 190, 192
 - 3D patterning 201, 202
 - topographical patterning 196, 200
 - types of 190
 - nanophase titania/PLGA composite scaffold 14
 - nano-scaled graphene oxide (NGO) 16
 - nanoscale interactions 107, 108
 - nano-silver embedded collagen scaffold 11
 - nano-structural hydrogel scaffolds 13
 - nanotopography, with extracellular matrix (ECM)
 - anisotropic heart contraction and action potential propagation 283
 - biochemical and biomechanical support 282
 - multi-domain biomacromolecules 283
 - nanoscale adhesive proteins 283
 - polysaccharides 283
 - nanotube oxide layer 220, 223
 - nanotubular arrays 223
 - drug delivery and other preload applications 228, 230
 - hydroxyapatite formation 223, 224

- in vitro biocompatibility studies 225, 226
 in vivo biocompatibility studies 227
 NaOH-treated PLGA scaffolds 13
 natural and synthetic polymeric biomaterials 18
 NC NiTi alloy 53
 NC Ti-6Al-4V 53
 near-infrared fluorescence (NIRF) probes 19
 nerve tissue engineering 77, 78
 electrospinning 153
 neural stem cells (NSCs) 87
 neural tissue engineering 9, 12
 behavioral analysis 292
 bioactive molecules 292
 bioactive scaffold 292
 CNTs 88, 89
 electrically conductive materials 293
 electrospinning technique 292
 graphene 89
 hydrogels and sponges 291
 neural cells survival and differentiation 292
 peptide-based self-assembling nanofibers scaffold 291
 self-assembly 292
 next generation polymer nanofibers 79
- O**
 optical coherence tomography (OCT)
 imaging 364
 optical imaging technology 409
 organic dyes 370
 organic-inorganic based materials 23
 organosoluble polymers 147
 osteogenic protein-1 (OP-1) 230
 ovalbumin (OVA) proteins/peptides 175
 oxygen plasma treated SWCNT (O-SWCNT) 91
- P**
 paclitaxel (PTX) 175
 PAMAM-grafted TiO₂ nanotubes 229
 PEGylation 121
 peptide nanotubes 116, 118
 peptide self-assembly 111
 photoacoustic imaging 364
 photodynamic therapy (PDT) 313
 photosensitizers 317
 phototherapy 418
 photothermal effects 369
 photothermal tumor therapy 359
 plasminogen activator (PA)/plasmid system 309
 PLGA-carboxyl functionalized MWCNT composite films 90
 PLGA scaffold 7
 P(LLA-CL) nanofibrous tubular grafts 8
 P(LLA-CL) scaffolds 8
 poly(acrylic acid) (PAA)-grafted CNT substrates 88
 poly(allylamine) (PAH) 167
 poly(amidoamine) (PAMAM) dendrimers 404
 poly(β -benzyl-L-aspartate) (PBLA) 122
 poly(ϵ -caprolactone) (PCL) 66
 (poly)dimethylsiloxane (PDMS) 242
 poly(DL-lactic acid) (PDLLA) 122
 polydopamine–vitronectin peptides 191
 polyether-co-polyether (PEPE) dendrimer 410
 poly(ethylene glycol) (PEG) 168
 poly(ethyleneimine) (PEI) 167
 poly(ethyleneimmine) coated
 poly(lactide-*co*-glycolide) microspheres 12
 poly(L-glutamic acid) (PGA) 168
 poly(glycolic acid) (PGA) 66
 polyhedral oligomeric silsesquioxane (POSS) nanocubic core 405
 poly(hydroxyl butyrate) (PHB) 66
 poly(lactic acid) (PLLA) 66
 Poly(L-lactic acid)(PLLA)-based nanofibrous scaffolds 287
 poly(lactic-*co*-glycolic) acid (PLGA) 121
 poly(L-lactide) acid 88

- poly (D,L-lactide-co-glycolide)
 (PLGA)-collagen I nanofibers 70
 poly-L-lysine (PLL) 167
 polymer based nanobiomaterials 19
 polymer based nanomaterials 18
 polymer capsules 165
 polymeric drug carriers
 PEGylation 121
 poly(lactic-co-glycolic) acid (PLGA)
 121
 polymeric micelles 122
 polymeric micelles 122, 123
 polymeric nanobiomaterials
 biomimetic microenvironment 66
 structural features 66
 types of 66, 67
 polymeric nanodevices 415
 polymeric nanofibers 67
 basic properties of 69
 biological relevance of 71, 73
 bone tissue engineering 75, 77
 definition 67
 electrospinning setup 67, 68
 gradient nanofibers 74, 75
 hybrid nanofibers 72, 74
 major characteristics 69
 major controlling factors 68
 microenvironmental cues 69, 70
 nerve tissue engineering 77, 78
 stem cell-based tissue engineering 79
 surface properties 67
 synthesis of 67
 Taylor cone 68
 various forms of 69
 vascular tissue engineering 78, 79
 polymeric nanoparticles 463
 polymer nanobiomaterials, *see also*
 polymeric nanofibers
 polymer-TiO₂ NT nanocomposites 229
 poly(methacrylic acid) (PMA) 168
 hydrogel capsules 180
- polymethylglutarimide nanofiber
 scaffolds 72
 poly(methyl methacrylate) (PMMA) 198
 poly(*N*-isopropylacrylamide)
 (PNIPAAm) 124
 polyol method 335
 polysaccharides 283
 polystyrene (PS) fibers 151
 poly(styrene-*b*-4-vinyl pyridine)
 (PS-*c*-4-P4VP) block copolymer
 templates 191
 poly(styrene sulfonate) sodium salt
 (PSS) 167
 poly(vinyl alcohol) (PVA) gel 12
 polyvinyl alcohol modified GSNs
 (pGSNs) 370
 poly(*N*-vinylpyrrolidone) (PVPO) 168
 porous biomaterials 290
 porous scaffold 290
 porous silicon nanoparticles
 animal body 387
 cell targeting 386
 covalent attaching drugs 384
 drug loading efficiency and drug
 releasing profile 394
 drug release 395, 396
 electrochemical etching-sonication
 synthesis 380
 hydrodynamic diameter 385
 physical adsorption drugs 384
 physical trapping 384
 post grafting 395
 properties 381
 silicic acid 385
 surface modifications 385
 synthesis of 381, 392, 394
 thermodynamic principles 395
 positron emission tomography (PET) 259
 potentiometric sensors 87
- q**
- QD-linked protein (MBP) 21
 quantum dot based nanobiomaterials 19, 21, 466

- r**
- radiotherapy 312
 - Raman spectroscopy 111
 - reticuloendothelial system (RES) 408, 413
- s**
- scanning tunneling microscopy (STM) 110
 - secondary structure transition peptides 115
 - seed-mediated method 361
 - self-aggregation associated energy transfer (SAET) effect 409
 - self-assembled nanostructured scaffolds 9
 - self-assembling peptides
 - β -sheet forming peptides 112, 114
 - coiled-coil peptides 114
 - collagen-like triple-helical peptides 114, 115
 - driving force 112
 - nanofibers and hydrogel 115, 117
 - peptide nanotubes 116, 118
 - secondary structure transition peptides 115
 - self-assembly and its applications 111
 - surfactant peptides 118
 - self-assembly method 287, 292
 - self-ordered ZrO₂ nanotubular arrays 222
 - SERS detection and imaging 365
 - severe plastic deformation (SPD)
 - accumulative roll-bonding 46
 - disintegrated melt deposition 47
 - equal channel angular pressing 43–45
 - high pressure torsion 45, 46
 - multi-pass caliber rolling 47
 - silane-based SAMs 194
 - silica nanoparticles 17, 18
 - silicon nanocrystals
 - application, in drug delivery 391, 393
 - gas-state synthesis 387
 - hydride-terminated silicon nanocrystals 386
 - hydrogen silsesquioxane (HSQ) 386
 - properties 389, 390
 - silane 387
 - solid-state synthesis 387
 - surface chemistry 387, 389
 - Silicon oxide 265
 - silicon-based nanoparticles
 - mesoporous silica nanoparticles 379
 - porous silicon nanoparticles 380
 - animal body 387
 - cell targeting 386
 - covalent attaching drugs 384
 - electrochemical etching-sonication synthesis 380
 - hydrodynamic diameter 385
 - photolithography 380
 - physical adsorption drugs 384
 - physical trapping 384
 - properties 381, 384
 - silicic acid 385
 - surface modifications 385
 - synthesis of 381
 - silicon nanocrystals 386, 393
 - silk-MWCNT 89
 - silver nanoparticles 465
 - single cell gel electrophoresis (SCGE) assay 434
 - single-walled carbon nanotubes (SWCNTs) 15, 85
 - skin tissue engineering
 - electrospinning 154, 155
 - SN38 (NGO-PEG-SN38) 16
 - sol-gel method 334
 - spin LbL assembly 169, 171
 - spray LbL assembly 171
 - stem cell-based tissue engineering 79
 - superparamagnetic iron oxide nanoparticles (SPIONs) 285, 407, 416
 - surface functionalization of carbon nanotubes 128
 - surface functionalization of graphene 126
 - surface mechanical attrition treatment (SMAT) 53
 - surface modification 189
 - surfactant peptides 118

- SWCNT/polymer films 11
synthetically-derived biocompatible polymers 66
- t**
Ta₂O₅ nanotubular arrays 222
targeting tumour-associated antigens (TAAs) 314
template synthesis method 286, 361
tendon and ligament tissue engineering 155, 156
tetraethyl orthosilicate (TEOS) 392
tetramethylorthosilicate (TMOS) 392
theranostics
 CT imaging 417, 418
 MRI 415
 phototherapy and fluorescence imaging 418
thermal decomposition 331
thiol-functionalized PMA (PMA_{SH}) films 168
three-body abrasive wear 55
3D bioprinting 287
three-dimensional (3D) nanofibrous matrix 68
3D nanofibrous scaffolds 8, 286
3D patterning 201, 202
3D peptide-amphiphilic (PA)
 nanofibrous scaffold 14
3D PLLA electrospun nanofibrous scaffolds 14
3D polyethylene glycol dimethacrylate nanofiber hydrogel matrix 72
Ti-6Al-4 V alloy 45
Ti-13Nb-13Zr alloy 57
Timplant 59
TiO₂ nanotubes 216
 effect of anodization duration 219
 effect of applied potential 219
 fluoride concentration on 216, 217
 nanotube oxide layer 220, 223
 pH value 218
tissue engineering 345
tissue regeneration
 biomimetic scaffolds 281
 nanocomposite biomaterials 288
- nanotopography, with extracellular matrix (ECM) 283
anisotropic heart contraction and action potential propagation 283
biochemical and biomechanical support 282
multi-domain biomacromolecules 283
nanoscale adhesive proteins 283
polysaccharides 283
skin dermis 283
neural tissue engineering 291
organ transplantation 281
titanium tantalum (TiTa) alloys 201
topographical patterning 196, 200
transfer printing process 242, 243
transferrin (Tf) 370
transforming growth factor β 1 (TGF- β 1)
 loaded nanoparticles 12
transmission electron microscopy (TEM) data 409
traztuzumab 270
triggered drug release 123, 124
tumor photothermal therapy 373
two-body abrasive wear 55
two-photon imaging (TPI) 372
type I collagen 213
Tyr-Ile-Gly-Ser-Arg (YIGSR) peptide 78
tyrosine receptor kinase A (TrkA) 204
- u**
UFG 316L stainless steel 53
ultrafine grained materials 40–42
ultrasound 262
- v**
vascular endothelial growth factor (VEGF) 307
vascular tissue engineering 7, 78, 79
 electrospinning 152
- w**
water-soluble polymers 147
wound-dressing materials 157, 159
- x**
X-ray diffraction (XRD) 111