

# Index

## A

- Acylation, lipase-catalyzed, 89
- O-Acylchitin, 7
- Aeromonas caviae*, PHBHHx, 37
- Aeromonas hydrophila*, PHBHHx, 37
- Alcaligenes latus*, 36
- Alcohol dehydrogenases, 89
- Aldehyde-modified liposomes, 257
- Alkyl deacetylated chitin, 7
- Alkylamines, 55
- Alkylchitosans, 9
- Alkyne-modified liposomes, 263
- Ambrettolide, 75
- Amine-modified liposomes, 255
- Amphotericin B (AmB), 225
- Annexin-A5, 259
- Arginine-glycine-aspartic acid (RGD), 183
- Armoracia rusticana*, horseradish peroxidase, 50
- Aryl-alcohol oxidase (AAO), 50
- Aspergillus niger*, lipase, 85
- Aspergillus oryzae*, lipase, 114
- Atom transfer radical polymerization (ATRP), 79
- Azinobis-(3-ethylbenzothiazoline)-6-sulfonate (ABTS), 49

## B

- Bacillus* spp., 36
- Bathophenanthroline disulfonic acid, 263
- 5-Benzyloxy-trimethylene carbonate (BTMC), 77
- Biodegradability, chitin/chitosan, 4
- Biofuels, 29, 40
- Biofunctionalization, 97
- Bio-implant materials, 38

- Biological targeting, 251
- Biomaterials, 29, 145
- Biomimetic material processing (BMMP), 182
- Biomimetics, 181
- Bioplastics, 29
- Biopolyesters, 29
- Biopulping, 59
- Bis(benzoyloxyethyl) terephthalate (PET trimer), 105
- Bis(2-chloroethyl) adipate, 85
- Bis(2-chloroethyl)(±)-2,5-dibromoadipate, 85
- Bis(hexadecyloxy)propoxyethoxyethoxy-ethoxyethyl]hex-5-ynamide, 263
- Bis(2-hydroxyethyl terephthalate) (BHET), 104
- Bis(hydroxymethyl)butyric acid (BHB), 79
- Bis-(*p*-methylbenzoic acid)-ethylene glycol ester (PET dimer), 105
- Bis(2,2,2-trichloroethyl) *trans*-3,4-epoxyadipate, 85
- Bis(2,2,2-trichloroethyl)(±)-3-methyladipate, 85
- Blends, 1
- Block copolymers, 69
- Bone morphogenetic proteins (BMPs), 127, 164
- Bromoacetyl-modified liposomes, 260
- Brown-rotted wood, 59
- 1,4-Butanediol, 85

## C

- Candida antarctica* lipase B (CALB), 71
- Candida rugosa* lipase, 85
- $\epsilon$ -Caprolactone (CL), 73, 79
- Carbodiimides, 17

**C (cont.)**

- Carbonates, cyclic, 76
  - ring-opening polymerization, 76
- Carboxylesterase, 106
- Carboxylic acid-modified liposomes, 257
- Catechin, 54, 56
- Catenin, 128
- Cell-adhesion peptides, 153
- Chemoenzymatic polymerization, 69, 79
- Chiral polymers, 69
- Chirality, polymers, 83
- Chitin carbamates, 7
- Chitin/chitosan, 1, 3
  - chemically modified, 7
  - enzymatic depolymerization, 6
  - enzymatic functionalization, 5
  - enzymatic modification, 4
  - fibers, 10
- Chitooligosaccharides (COS), 4
- Chitosan, 1, 3
  - hydrogels, 12
  - nanofibers, antimicrobial activity, 12
  - polyvinyl alcohol (PVA), 14
  - tyrosine-containing peptide, 197
- Chitosan/collagen matrices (CCM), 17
- Chromobacterium* sp., lipase, 85
- Cladosporium cladosporioides*, esterase, 106
- Collagen, 183, 188
- Concanavalin A (Con A), 230
- Coniophora puteana*, 59
- Connexin, 36, 40
- Cutinase, 97, 100, 109
- Cyanur-modified liposomes, 262
- Cyclic PET trimers (CTR), 104
- Cyclobis(decamethylene carbonate) (DCM)<sub>2</sub>, 77
- Cyclodextrins, 10, 168, 207
- Cysteine-modified liposomes, 261

**D**

- 6-Deoxychitin, 7
- Dialkylphthalates, 106
- Dibenzodioxocin, 58
- Di-*O*-butyryl chitin, 7
- Diesel, 40
- Diethyl terephthalate (DET), 105
- Diethylphenyl acetamide, 109
- Diethyl p-phthalate (DP), 105
- Dihydrotestosterone (DHT), 129
- Dimethyl-1,3-benzenedimethanol, 86
- 5,5-Dimethyl-trimethylene carbonate (DTC), 77
- Dimethyl suberimidate, 256

- 3-Diphenylphosphino-4-methoxycarbonylbenzoic acid, 264
- Disulfide isomerase (PDI), 133
- Dodecanolide (DDL), 75
- Drug delivery, carriers, 40
  - cyclodextrin, 207, 211
  - ELRs, 163
  - liposomes, 251
- Drug targeting, 29
- Dynamic kinetic resolution (DKR), 87
  - chemoenzymatic, 84

**E**

- Elastin-like recombinamers (ELRs), 145, 147
  - biosurface engineering, 159
  - drug delivery, 163
  - fusion protein purification, 168
  - photoresponsive, 167
  - self-assembly, 150
  - stimuli-responsive behavior, 150
  - tissue engineering, 152
- Electrospraying, 166
- Electrostatic self-assembly (ESA), 161
- Enantioselectivity, lipase-catalyzed polymer reactions, 83
- Enhanced green fluorescent protein (EGFP), 43
- Enzymes, 70
  - polymerization, 70
- Epidermal growth factor (EGF), 160, 199
- Esterases, 97, 99, 102, 106
- Estrogens, 130
- Ethyl-3-(3-dimethylaminopropyl) carbodiimide (EDC), 17
- Ethylene glycol dibenzyl ester (BEB), 105
- 1,2-Ethylene-bis-terephthalate (EBT), 104
- 1,2-Ethylene-mono-terephthalate-mono (2-hydroxyethyl terephthalate) (EMT), 104
- Extracellular matrix (ECM), 152, 182

**F**

- Factor XIIIa transglutaminase, 190
- Feed additives, 43
- Fermentation, 29
- FGF, 13
- Fibers, chitin/chitosan, 1
- Fibrinogen, 183
- Fibroin-chitosan scaffolds, 18
- Fibronectin (FN), 183
- Finasteride, 130
- Fluorophenols, 55

- Follicular morphogenesis, 121  
*Fomitopsis pinicola*, 59  
 Functional polymer, 47  
*Fusarium solani*, cutinase, 110
- G**  
 $\beta$ -Galactosidase, 43  
 Gallic acid, 57  
 Gasoline, 40  
 Gelatin, 5, 11, 13, 18, 131, 188, 196  
   scaffolds, 189  
 Gene delivery, 207  
 Genipin, 15, 18  
 Globalide, 75  
*Gloeophyllum trabeum*, 59  
 Glycidyl methacrylate (GMA), 81  
 Glycosaminoglycans, 11, 13  
 Gold-AzoGlu15, 169  
 Grafting, hydrophobic enhancing functional  
   molecules, 54  
   lignin, reactive functional molecules, 51  
   natural antimicrobial functional  
   molecules, 54  
 Guaiacol sulfonate, 51
- H**  
 Hair, fiber surface/structure,  
   modifications, 132  
   follicles, 121  
     development/cycling, molecular  
     control, 127  
     growth disorders, 130  
     life cycle, 121  
 hEGF-PhaP-nanoparticles, 41  
 Heme peroxidases, 49  
 Hexadecalactone, 75  
 Hexafluoroacetone, 3  
 Hexafluoroisopropanol, 3  
 High density fibreboard (HDF), 55  
 Horseradish peroxidase (HRP), 6, 49  
 Hydrazide-modified  
   liposomes, 258  
 Hydrogels, 198, 209  
   chitin/chitosan, 1  
 Hydrolases, 6, 70, 109  
 4-Hydroxy-3-methoxybenzylurea, 58  
 N-Hydroxyacetanilide (NHA), 49  
 Hydroxyalkanoate methyl ester  
   (3HAME), 40  
 Hydroxyalkanoic acids, chiral, 39  
 1-Hydroxybenzotriazole (HBT), 49  
 3-Hydroxybutyrate (3HB), 30, 37
- R*-3-Hydroxybutyrate methyl ester  
   (3HBME), 40  
 Hydroxycinnamics, 56  
 Hydroxyethyl(meth)acrylate  
   (HEA/HEMA), 73  
 3-Hydroxyhexanoate (3HHx), 37  
 3-Hydroxypropionate (3HP), 34  
 10-Hydroxyundecanoic acid, 85
- I**  
 Immunoliposomes, 265  
 Indulin (kraft lignin), 51  
 Intein, 42  
 Inverse temperature transition (ITT), 148, 150  
 Iodochitin, 7  
 Isopropyl aleuritate, 79  
*N*-Isopropylacrylamide (NIPAAm), 224  
 Iterative tandem catalysis (ITC), 87
- K**  
 kerA, 133  
 Keratin, 121
- L**  
 Laccases, 5, 47, 50  
 Lactones, ring-opening polymerization, 71  
 Laminin (LN), 183  
 Latanoprost, 131  
 Laurylgallate, 54  
 Lignin, binder for particle boards, 56  
   functionalization, 50  
 Lignin peroxidases (LiPs), 49  
 Lignocellulose, 47  
   materials, functionalisation, 54  
   polymers, aesthetics, 62  
 Lipases, 70, 97, 109, 113  
   enantioselectivity, 84  
   polymerizations, 69, 71  
 Liposomes, folate-modified, 268  
   surface functionalization, 251  
 Lymphoid-enhancer factor 1 (Lef1), 127  
 Lysine oxidase, 135
- M**  
 Macrolactones, 75  
 Macromolecules, 145  
 Maleimide-modified liposomes, 258  
 Maltose-binding protein (MBP), 43  
 Manganese peroxidases (MnP), 49  
 Matrix metalloproteinases (MMPs), 4, 153

**M (cont.)**

Medium-density fibreboards (MDF), 55  
 manufacturing, 59  
 Melanin production, 126  
*Melanocarpus albomyces*, steryl esterase, 106  
 Membrane anchors, 271  
 6-Mercapto-1-hexanol, 74  
 Mercaptochitin, 7  
 11-Mercaptoundecanoic acid, 74  
 Methyl ester of PHB monomer (3HBME), 32  
 5-Methyl-5-benzoyloxycarbonyl-1,3-dioxan-2-one (MBC), 77  
 4-Methylcaprolactone (4-MeCL), 81  
 6-Methylcaprolactone (6-MeCL), 87  
 $\alpha$ -Methylenemacrolides, 76  
 Microtopographical surfaces, 161  
 Minoxidil, 130  
 Mono(2-hydroxyethyl) terephthalate (MHET), 104

**N**

Nanoparticles, 251  
 Nanotopographical surfaces, 161  
 Neurotrophins, 127  
*p*-Nitrobenzyl esterases, 106  
*p*-Nitrophenylcarbonyl-modified liposomes, 262  
*p*-Nitrophenylcarbonyl-PEG-1,2-dioleoyl-*sn*-glycero-3-phosphoethanolamine (*p*NP-PEG-DOPE), 262  
 Notch signaling pathway, 127  
 Novozym 435, 71

**O**

Osteopontin, 183  
 Oxidoreductases, 57  
 6-Oxychitin, 7  
 Oxytyrosinase, 195

**P**

Papain (cysteine protease), 106  
 Paper, properties, 59  
 Particleboard (PB), 55  
 lignin, 56  
 PEG, 79  
*Penicillium citrinum*, esterase, 106  
 Pentadecanolide (PDL), 75, 77  
 Peptides, 269  
 Peroxidases, 5, 47  
 PET see Poly(ethylene terephthalate)  
 PHA granule-binding protein (PhaP), 40

PHA synthase PhaC, 30  
*phaCAB*, 36  
 Phasin, 41  
 Phenol formaldehyde (PF) adhesives, 56  
 Phenolics, 60  
 antimicrobial, 54  
 Pilling, PET textiles, 107  
 PNIAAm/polyrotaxane hydrogels, 224  
 PNIPAM, 159  
 Polyalcohols, enzymatic grafting, 83  
 Polybutadiene, 79  
 Polycarbonates, 76  
 Polycondensation, 69  
 enantioselective, 85  
 lipase-catalyzed, 77  
 Polyelectrolyte complexes (PEC), 4  
 Polyesters, 69, 70, 97  
 Polyethylene (PE), 75  
 Polyethylenimine (PEI), 210  
 Polyfluoroester, frizz control, 134  
 Polyhydroxyalkanoates (PHA), 29, 281  
 medium-chain-length, 36  
 microbial production, 30  
 production by plants, 37  
 short-/medium-chain-length copolymers, 36  
 short-chain-length, 34  
 Poly-4-hydroxybutyrate (PHB), 29, 38  
 Poly-3-hydroxyoctanoate (PHO), 38  
 Polymer modification, enantioselective, 88  
 Polypseudorotaxane, 207  
 Polyrotaxanes, cyclodextrin-based, 207, 227  
 stimuli-responsive dethreading, 236  
 Polyseudorotaxanes, gene delivery, 237  
 Polyvinyl alcohol (PVA)/chitosan/fibroin (PCF), 14  
 Poly(butylene succinate), 114  
 Poly(butylene succinate-co-adipate), 114  
 Poly(caprolactone) (PCL), 82, 220  
 Poly(CL-*b*-styrene), 81  
 Poly(dimethylsiloxane) (PDMS), 189  
 Poly(ethylene glycol) (PEG), 198, 253  
 Poly(ethylene glycol) methyl ether methacrylate (PEGMA), 225  
 Poly(ethylene terephthalate) (PET), 78, 97  
 biocatalytic surface modification, 105  
 hydrolases, 104, 109  
 surfaces, enzymatic effects, 99  
 Poly(HEMA-co-MMA), 83  
 Poly( $\beta$ -hydroxyalkanoic acid), 217  
 Poly(3-hydroxybutyrate-co-3-hydroxyhexanoate), PHBHHx, 33  
 Poly(3-hydroxybutyrate-co-3-hydroxyvalerate) (PHBV), 31

- Poly(*n*-isopropylacrylamide) (PNIPAM), 159  
 Poly(MMA-*b*-(*R*)MCL), 80  
 Poly(MMA-co-HEMA), 83  
 Poly(pentadecalactone) (PPDL), 75  
 Poly(perfluorooctyl methacrylate) (PFOMA), 80  
 Poly(trimethylene terephthalate) (PTT), 104  
 Poly(VPGVG), 149, 153  
 Porcine pancreatic lipase (PPL), 77, 85  
 Post-functionalization, 255, 265  
 Post-insertion, 254  
 Protein purification, 29  
   platform, 41  
 Protein-based biomaterials, 146  
*Pseudomonas cepacia* lipase, 75  
*Pseudomonas fluorescens* lipase, 77  
*Pseudomonas mendocina*, cutinase, 111  
   PET hydrolases, 104  
*Pseudomonas* spp., mcl PHA, 36  
 Pseudopolyrotaxanes, 226
- Q**  
*o*-Quinones, 197
- R**  
*Ralstonia eutropha* (*Alcaligenes eutrophus*), 36  
 Reactive oxygen species (ROS), 9  
 Recombinamers, 147  
*Rhus vernicifera*, laccases, 50  
 Ring-opening polymerization (ROP), 69  
   enantioselective, 87  
 Ru-Noyori type racemization catalyst, 86
- S**  
 Saccharides, 268  
*Salmonella* infections, 43  
 Sebaceous glands, follicular targeting, 132  
 Short-chain fatty acids (SCFAs), 43  
 Shvo's catalyst, 86  
 Sodium 2-mercaptoethanesulfonate (MESNA), 261  
 Sonic hedgehog (Shh), 127  
 Sorbitol, 78  
 Soya bean peroxidase (SBP), 52  
 Spatial learning, 32  
 Steryl esterase, 106  
 Surface functionalization, nanoparticles, 251
- Surface modification, PET, 105  
 Surfaces, stable reactive, 57  
 Syringylglycerol-guaiacyl ether, 58
- T**  
 Tannic acid-laccase, 59  
 Tat-ELR, 166  
 Terephthalic acid (TPA), 98  
 TGF- $\beta$ , 13  
*Thermobifida fusca*, cutinase, 112  
   PET, 103  
 Thermodynamically reversible addressing of proteins (TRAP), 160  
 Thermomechanical pulps (TMP), 60  
*Thermomyces insolens*, lipase, 113  
   PET hydrolases, 104, 107  
*Thermomyces lanuginosus*, lipase, 113  
   PET, 103  
 Thermostability, 97  
 Thiobutyrolactone, 74  
 Thiol-modified liposomes, 259  
 Thrombospondin, 183  
 Thyroid hormones, melanin synthesis, 129  
 Tissue engineering, 1, 152, 181  
 Tissue repair, chitin/chitosan, 7  
 Tosyl chitin, 7  
*Trametes hirsuta*, 59  
*Trametes versicolor*, laccase, 59  
*Trametes villosa*, laccase, 63  
 Transglutaminases, 5, 135, 181, 185  
   biomedical applications, 187  
   modification of biomaterials, 185  
 Trimethylcarbonate (TMC), 76  
 Triphenylsilyl chitin, 7  
 Triphosphine-modified liposomes, 264  
 Tumor cells, 264  
 Tumor vasculature, 264  
 Tyrosinase, 5, 181  
   biomedical applications, 195  
   modification of biomaterials, 194
- U**  
 Undecanolide (UDL), 75
- V**  
 Vanillylamine, 51  
 Vinyl(meth)acrylates, 73  
 p-Vinylphenylethanol, 89  
 Violuric acid (VA), 49

**V** (*cont.*)Vitronectin (VN), [183](#)von Willebrand factor, [183](#)**W**Wood adhesive, [52](#)Wood composites, manufacturing, [55](#)Wood veneers, hydrophobicity, [55](#)Wound dressing materials, chitin/chitosan, [19](#)Wound healing, chitin/chitosan, [7](#)ELRs, [160](#)**Y**Y-shape block copolymers, [81](#)