

# Author Index

- Abe, H., 111  
 Al-Azemi, T., 175  
 Baker, P., 141  
 Bale, S., 103  
 Barrera-Rivera, K., 227  
 Baum, I., 265  
 Bentley, W., 35  
 Berghuis, A., 343  
 Bisht, K., 175  
 Borkar, I., 103  
 Bouldin, R., 315  
 Bruno, F., 315  
 Bruns, N., 17  
 Chen, F., 45  
 Chen, W., 281  
 Cheng, H., xi, 1, 255  
 Cooke, P., 71  
 DeAngelis, P., 299  
 Dinu, C., 103  
 Dordick, J., 103  
 Ebata, H., 237  
 Fels, G., 265  
 Fishman, M., 71  
 Focarete, M., 201  
 Fuhlendorff, B., 305  
 Ganesh, M., 375  
 Gross, R., xi, 1, 201, 375, 385  
 Gu, Q., 255  
 Hasegawa, Y., 343  
 He, A., 425  
 Hotchkiss, A., 71  
 Ito, Y., 111  
 Iwaki, H., 343  
 Jiang, Z., 213  
 Kane, R., 103  
 Kawai, F., 405  
 Kokil, A., 315  
 Kumar, J., 315  
 Larock, R., 87  
 Lau, P., 343  
 Leisch, H., 343  
 Li, L., 281  
 Lichtenberg, J., 305  
 Liu, J., 213  
 Liu, M., 111  
 Liu, X., 281  
 Liu, Y., 35  
 Longin, F., 305  
 Loos, K., 265  
 Lu, W., 385  
 Lu, Y., 87  
 Marcos-Fernández, Á., 227  
 Martínez-Richa, A., 227  
 Matsumura, S., 237  
 Mirza, I., 343  
 Montclare, J., 141  
 Nagarajan, R., 315  
 Nagarajan, S., 315  
 Payne, G., 35  
 Puskas, J., 417  
 Ravichandran, S., 315  
 Renggli, K., 17  
 Ronkvist, Å., 385  
 Samuelson, L., 315  
 Sanford, K., 103  
 Scandola, M., 201  
 Schertz, D., 439  
 Schobers, L., 125  
 Schoffelen, S., 125  
 Schwab, L., 265  
 Schwach-Abdellaoui, K., 305  
 Sen, M., 417  
 Shi, X., 35  
 Sun, X., 59  
 van Hest, J., 125  
 Venkateshan, K., 59  
 Venselaar, H., 125  
 Vriend, G., 125  
 Wang, J., 425, 439  
 Wang, P., 281  
 Whited, G., 103  
 Woodward, R., 281  
 Xie, W., 385  
 Yachnin, B., 343  
 Yang, X., 35  
 Yasuda, M., 237  
 Yi, W., 281  
 Yu, J., 161  
 Zhang, J., 45  
 Zhu, G., 103

# Subject Index

## A

- $\alpha,\omega$ -Telechelic poly( $\epsilon$ -caprolactone) diols, 229f
- Acetonide, 194t
- Acinetobacter sp.*, 345t, 347
- Acyl-enzyme complex, 273f
- Alcohol and IA-Me, reactivity, 248t
- Alcoholysis reaction
  - PBS, 433f
  - polylactic acid, 430f
- Aliphatic polyesters, 425
- Alkaline soluble polysaccharide
  - composition analysis, 79t
  - Mark-Houwink plot, 81f
  - molecular properties, 80t, 82t
  - neutral sugar recovery, 80t
  - weight percentage recovery, 79t
- Amphiphilic conetwork, 23f
- Amycolatopsis sp.*, 410f
- Antigen-responsive hybrid hydrogel, 24f
- AoC, 147f
- Aptamer-hemin complexes, 121t
- Aptazymes, 120f, 121t
- ASP. *See* Alkaline soluble polysaccharide
- ASP I, 83f
- ASP II, 84f
- Aspergillus oryzae* cutinase. *See* AoC
- Azidohomoalanine, 127s

## B

- Bacterial cells
  - and 4-ketovaleric acid, 164t
  - and valeric acid, 164t
- Bacterial polysaccharides
  - biosynthesis, 284
  - remodeling, 291
- Baeyer-Villiger monooxygenases. *See* BVMO
- B antigen, 286f
- BD
  - lipase CA, 244f
  - lipase PS-D, 239s
  - polycondensation, 239s
  - polymer yield, 241f, 244f
- $\beta$ -Hydroxy-2-ketones, 363t
- Bicyclo[3.2.0]hept-2-en-6-one, 366f
- Biobased elastomer, 237
- Biobased materials

- lipids, 5
- polysaccharides, 5
- triglycerides, 5
- Biocatalysis, 1, 8t
  - and polymers, 201
- Biocatalysts, 2, 6
- Biocatalytic redox polymerizations, 7
- Biofabrication, 35
- Biomaterials, 1, 6
- Biopolymers, 35, 37
- Biotransformations, cutinase, 141, 152f
- $\beta$ -Lactams
  - activation, 273f
  - Cal-B mediated polymerization, 272f
- BoPET, 389f
- $\beta$ -Propiolactam
  - enzymatic ring-opening polymerization, 268f
- Bulk urea crystals, 67f
- Butane-1,4-diol. *See* BD
- BVMO, 345t
  - $\beta$ -hydroxy-2-ketones, oxidation, 363t
  - bicyclo[3.2.0]hept-2-en-6-one,
    - oxidation, 366f
  - crystal structures, 349f
  - 4-hydroxy-2-ketones, 360f
  - oxidations, 363t
  - type I, 349f
  - Xanthobacter sp.*, 360f

## C

- C<sub>16</sub>, C<sub>18</sub> epoxy fatty acids, 143f
- C<sub>16</sub>, C<sub>18</sub>  $\omega$ -hydroxy fatty acids, 143f
- CALB, 267f
  - with AOT, 377s
  - dimerization, 128s, 129f, 132f
  - dimers, 128s
  - hydrolytic activity, 129f
  - methionine, 130f
  - mutants, 130t
  - and polymerization, 272f
- CALB embedded PCL, 378f
  - FITC tagged CALB, distribution, 382f
  - vs. external addition, 379t
  - PCL films, 380f
- Candida antarctica* lipase B. *See* CalB
- Cationic polymerization, soybean oils, 88
- CDCl<sub>3</sub>, 246f
- Chitosan

electrodeposition process, 39f  
primary amines, 39f  
Tyr-tagged protein, 40f  
CHMO, 349f, 353f, 355f  
Copolymerization, PDL with EGA, 216f  
Covalently linked enzyme dimers, 125  
*Cryptococcus sp.*, 410f  
Cutin, 143f  
Cutinase  
  biotransformations, 141  
  hydrolysis rates vs. concentration, 395f  
  immobilization, 148t, 150f  
  industrial applications, 146  
  and *lc*PET hydrolysis, 391f, 392f  
  non-traditional media, reactions, 150t  
  polymer applications, 152t  
  structure, 142  
Cyclic BD/IA oligomer, 245s  
Cyclic carbonate monomer, 178s  
Cyclobutanones, 361f  
Cyclododecane, 366f  
Cyclohexanone monooxygenase. *See*  
  CHMO

## D

1-Deoxy-11-oxopentalenic acid, 356f  
Dimethyl itaconate. *See* IA-Me  
4c15-s DNA  
  and hemin, 117f  
  and Soret band of hemin, 118f  
DNA  
  aptamers, 117f  
  random sequence region, 116t  
DNA aptamer-hemin complex, 120f

## E

*E. coli* O86  
  O-antigen biosynthesis, 286f, 287f  
  *Wzy* gene, 290f  
 $\epsilon$ -Caprolactone polymerization, 267f  
EDOT, SBP catalyzed polymerization,  
  336f, 337f  
Embedded enzyme matrix hydrolysis, 375  
Enzymatic ring-opening polymerization,  
  181t  
   $\beta$ -propiolactam, 268f  
  drying conditions, optimization, 270t  
  lactones, 267f  
  Novozym-435, 182f  
Enzymatic synthesis, electrically  
  conducting polymers, 316

Enzyme-catalyzed coupling, 35  
Enzyme-nanotube conjugates, 105f  
Esterification  
  1,8-octanediol, 134f  
  1-octanol, 133f  
  poly(ethylene glycol) diol, 135f  
2-Ethylcyclohexanon, 359t

## F

Flavin monooxygenases. *See* FMO  
FMO, 346  
  structures, 352  
F<sub>s</sub>C, 145f, 147f  
  hydrolytic activity, 143t  
  synthetic activity, 143t  
*Fusarium solani* cutinase. *See* F<sub>s</sub>C

## G

GalNAc-PP-lipid analogues, 289s  
GDP-Fuc, 293s  
Glissopal-OH, methacrylation product,  
  419f  
Glycosaminoglycan synthases, 299  
Glycosyltransferases WbnI and WbnK,  
  288t  
Gram-negative bacterial cell wall and  
  O-polysaccharides, 283f

## H

HA, 305, 307f, 309f  
  polymers, 301f  
  tetramer, 302f  
Heme cofactor, 321f  
Hemin, 121t  
Hemin-binding DNA aptamer, 113  
Hemin-binding RNA aptamer, 118f  
Homopropargylglycine, 127s  
HO-PEG-OH, methacrylation product,  
  423f  
12HS-Mc, 239s  
  lipase CA, 244f  
  lipase PS-D, 239s  
  polycondensation, 239s  
  polymer yield, 241f, 244f  
  and ring-opening polymerization, 245s  
HyaCare®, 308f, 309f, 310f  
Hyaluronic acid. *See* HA  
4-Hydroxy-2-ketones, 360f

- I**
- IA-Me  
 and alcohol, 248*t*  
 lipase CA, 241*f*, 244*f*  
 lipase PS-D, 239*s*  
 polycondensation, 239*s*  
 polymer yield, 241*f*, 244*f*
- Immobilized cutinase, 146
- 2-Indanone, 362*f*
- Ion-responsive hybrid hydrogel, 25*f*
- ITC monomer, 180*f*  
 enzymatic ring-opening polymerization, 181*t*  
 ring-opening polymerization, 184*t*
- K**
- 4-Ketovaleric acid, 164*t*, 165*t*
- L**
- Laccase, 321*f*, 335*f*
- Lactic acid, 410*f*
- Lactones, enzymatic ring-opening polymerization, 267*f*
- L-Alanine, 410*f*
- Lauryl lactone, 366*f*
- LcPET, 389*f*  
 degradation, 398*f*  
 films, 400*f*, 402*f*  
 hydrolysis, 391*f*, 392*f*, 401*f*  
 NaOH consumption, concentration, 397*f*
- LDPE films, 204*f*
- Lipase CA, 246*f*, 248*t*  
 BD, 241*f*  
 12HS-Me, 241*f*  
 IA-Me, 241*f*  
 ring-opening polymerization, 245*s*
- Lipase-catalyzed copolymerization  
 alkyl glycolate, 213  
 PDL, 213
- Lipase PS-D, 239*s*, 246*f*, 248*t*  
 ring-opening polymerization, 245*s*
- Lipids, 5
- M**
- Melt rheology, 432*f*, 446*f*, 450*f*
- Menthone oxidation, 349*f*
- Methacrylation product  
 Glissopal-OH, 419*f*  
 HO-PEG-OH, 423*f*  
 PDMS-dicarbiniol, 422*f*  
 PDMS-monocarbiniol, 420*f*, 421*f*
- Methionine, 127*s*
- Methyl 12-hydroxystearate. *See* 12HS-Me
- mFMO  
 dimer, 355*f*  
 monomer, 355*f*
- MTG-gelatin adhesive, 38*f*
- MtmOIV, 349*f*
- Multi-walled carbon nanotubes, 105*f*
- MWNT. *See* Multi-walled carbon nanotubes
- N**
- Natural polysaccharides, 283*t*
- Novozym-435, 182*f*
- Nucleic acid aptamers, 113*t*
- O**
- O-antigen biosynthesis pathway, 286*f*
- O-antigen biosynthetic gene cluster, 287*f*
- 1,8-Octanediol, esterification, 134*f*
- Octanediol adipate copolymer, 208*f*
- 1-Octanol, esterification, 133*f*
- Orthogonal enzymatic reactions, 40*f*
- P**
- PAMO, 349*f*, 356*f*  
 mutants, 359*t*
- PANI  
 DNA, formation on, 329*f*  
 doped forms, 327*f*  
 enzymatic synthesis, 322  
 photopatterning, 330*f*  
 polymeric templates, 328*f*  
 poly(styrene-4-sulfonate, sodium salt), 328*f*  
 synthesis, 330*f*
- PBAT/SPC blends, 54*f*  
 properties, 55*t*  
 water content, 55*f*
- PBS  
 alcoholysis reaction, 433*f*, 434*t*  
 modified, 434*t*, 435*f*
- PDL  
 and alkyl glycolate, 213

- copolymerization with EGA, 216s, 220t  
 lipase-catalyzed copolymerization, 213
- PDMS**  
 dicarbinol, methacrylation product, 422f  
 monocarbinol, methacrylation product, 420f, 421f
- PEDOT-PSS**, 336f
- PEG-PCL**  
 diblock, 230f  
 triblock, 230f
- Penicillium lilacinum*, and BVMO oxidations, 363f
- Peroxidase*, 321f  
 aptamer-hemin complexes, 120f  
 hemin, 120f
- PET hydrolysis**, 396t
- PHA**  
 biosynthesis, 161, 169t, 170f  
 formation, 169t  
 grafted, 448f  
 granules in bacterial cells, 163f  
 and 4-ketovaleric acid, 165t  
 and valeric acid, 165t
- PHA synthase*, 170f
- P3HB**, 166f, 167f
- P3HB3HV4HV**, 166f, 167f
- PHBV**  
 DSC traces, 451f  
 properties, 451t
- PHBV, grafted**  
 DSC traces, 451f  
 HEMA, 449f, 450f  
 melt rheology, 450f  
 thermal properties, 451t  
 torque changes, 449f
- Phenylacetone monooxygenase**. *See* PAMO
- 3-Phenyl-2-butanone**, 356f, 362t
- PLA**  
 alcoholysis reaction, 430f  
 continuous alcoholysis reaction, 431t  
 degradation  
   enzymes, 407t  
   microorganisms, 407t  
 modified, 431t, 432f  
 and SP/PLA blends, 52f
- PLA, grafting**  
 melt rheology, 446f  
 reaction, 445f  
 reactive extrusion process, 445f
- PLA depolymerase**  
 lipase-type, 410f  
 protease-type, 410f
- PLA/PVOH 30/70 film**, 447f
- PmHAS and PmHS enzymes, recombinant**, 301f
- P(OA-co-10mol%SiAA)**, 209f
- Polyamide compositions, unconventional**, 260f
- Polyamides synthesis**, 7
- Poly(aminoamide)**  
 structure, 259f  
 synthesis, 260f, 261f
- Polyaniline**. *See* PANI
- Poly( $\beta$ -alanine)**, 269f
- Polybutylene succinate**. *See* PBS
- Polycarbonates**  
 polyesters, synthesis, 8t  
 and renewable resources, 175
- Polycondensation**, 239s
- Polydimethylsiloxanes**. *See* PDMS
- Poly( $\epsilon$ -caprolactone) diols**, 231t
- Polyesters and polycarbonates**, 8t
- Polyester-urethanes, chemo-enzymatic syntheses**, 227
- Poly(ethylene glycol) diol, esterification**, 135f
- Poly(ethylene terephthalate)**. *See* PET
- Poly(12HS/BD/IA)**  
 crosslinking behavior, 249f  
 12HS content, effects, 249f  
 preparation, 246f  
 properties, 248t
- Polyhydroxyalkanoates**. *See* PHA
- Polyisobutylenes**, 419f
- Poly(ITC)**, 185f, 186f  
 deprotection, 192f
- Poly[ITC-block-CL]**, 189f  
 deprotection, 192f  
 and Sn(Oct)<sub>2</sub>, 188f, 190f
- Poly(44%ITC)-block-poly(56%  $\epsilon$ -CL)**, 194t, 195f
- Poly(lactic acid)**. *See* PLA
- Polymer chain growth**, 219s
- Polymers**  
 from biocatalysis, 201  
 electrically conducting, enzymatic synthesis, 316
- Poly(PDL-co-CL)**, 205f, 206t, 207f, 207t
- Poly(PDL-co-DO)**, 205f, 206t, 207f, 207t
- Poly(PDL-co-GA)**, 218f  
 nanoparticles, 223f  
 and polymer chain growth, 219s  
 structure, 221t  
 synthesis, 216s  
 triad distributions, 220t  
 yield, 221t
- Poly(PDL-co-VL)**, 206t
- Poly(PDL-50mol%TMC)**, 208f
- Polypeptides synthesis**, 7
- Polypyrrole**. *See* Ppy
- Polysaccharides**

modifications, 294f  
natural, 283f  
Polyurethanes  
  PA hybrid latex films, 98f  
  synthesized, 233f, 234t  
Poly( $\omega$ -pentadecalactone). *See* PPDL  
Porphyrins, 114f  
PPDL, 208f  
  fiber mat, 204f  
  films, 204f, 207f  
  properties, 207t  
Ppy, enzymatic synthesis, 333f  
Ppy-PSS, 335f  
Protein engineering, 356  
PTMC, 208f  
Pyrrole, polymerization  
  HRP, 333f  
  laccase, 335f  
2-Pyrrolidinone, 333f

## R

Radical polymerization, 91  
Renewable resources, and polycarbonates, 175  
Ring opening metathesis polymerization, 95s  
Ring-opening polymerization  
  cyclic BD/IA oligomer and 12HS-Me, 245s  
  ITC monomer, 185f  
  Novozym-435, 182f  
  Sn(Oct)<sub>2</sub>, 184f  
6c5 RNA, and Soret band of hemin, 119f  
RNA aptamer, 119f  
RNA aptamer-hemin, 120f  
ROMP. *See* Ring opening metathesis polymerization  
RU-PP-lipid, 289s  
RU-PP-Und, 293f

## S

SELEX. *See* Systematic evolution of ligands by exponential enrichment  
Self-assembled hybrid hydrogel, 30f  
Self-reporting hybrid materials, 30f  
Ser105-O, 275f  
Short-lived intermediate, rearrangement, 275f  
Sn(Oct)<sub>2</sub>

ITC monomer, copolymerization, 188f  
and poly(ITC), 185f  
and poly[ITC-block-CL], 188f  
polymerization, 185f  
ring-opening co-polymerizations, 185f, 187t  
  ring-opening polymerization, 184t  
Soybean oil, cationic polymerization, 90s  
Soybean oil-based waterborne polyurethane dispersions, 97s  
Soybean peroxidase, 335f  
Soy protein  
  bioplastics research, 46  
  blends, 48  
  development, 45  
  isolate, 66f  
SP. *See* Soy protein  
SPC/PLA blends, 50f  
  modulus, 53f  
  tensile strength, 53f, 55t  
  water absorption, 53f  
SPU. *See* Soybean oil-based waterborne polyurethane  
Substrate-responsive hybrid hydrogel, 27f  
Sugar beet pectin  
  AFM image, 77f, 78f  
  analysis, 75t  
  Mark-Houwink plot, 76t  
  molecular properties, 76t, 77t  
Sugar beet polysaccharides  
  characterization, 71  
  extraction, 71, 73f  
Systematic evolution of ligands by exponential enrichment, 113f

## T

Tartaric acid, 178s  
Temperature optimization, 270t  
Temperature-responsive hybrid hydrogel, 24f  
Thiophene, 327f  
Transglutaminase, 37f  
Tyrosinase, 37f, 40f

## U

Urea-soy protein composites, 68f  
  DSC scans, 63f  
  microscopy studies, 59  
  thermodynamics, 59

**V**

- Valeric acid, 164*t*, 165*t*
- Vegetable oils
  - bioplastics and biocomposites, 88, 91, 93
  - structure, 89*s*
  - waterborne polyurethane dispersions, 95
- Vinyl methacrylate. *See* VMA
- VMA
  - transesterification, 419*f*, 422*f*

**W**

- Waterborne polyurethane dispersions, 97*s*
- $\omega$ -Pentadecalactone. *See* PDI
- Wzy*, 292*f*

**X**

- Xanthobacter sp.*, 360*f*