

Index

a

- acid
 - Brønsted 236f.
 - Lewis 236
 - poly(lactic acid) PLA 313
 - poly(lactic-co-glycolic acid) 313, 317f.
 - proton 236ff.
 - sulfonic 386
- activation
 - energy 4, 17
 - negative molar 14
- addition reactions 81ff.
 - acylation 81, 83f.
 - carbon-carbon double bond 149f., 153
 - elimination 90ff.
 - fluorine 162
 - gas-solid 143
 - hydrogen 153ff.
 - Michael 84f.
 - miscellaneous 161f.
 - multiphase 143ff.
 - photochemical cycloaddition 86f., 105
 - photosensitized 88
 - radical 88
 - regioselective acylation 81, 86
- aliphatic nucleophilic substitution 47ff.
 - amide synthesis 49ff.
 - carbonyl carbon 49ff.
 - ester synthesis 54f.
 - saturated carbon 47ff.
- alkylation 57ff.
- amphiphilic 308
- phospholipid molecules 376
- aromatic substitution 57ff.
 - brominations 66ff.
 - electrophilic 57f., 69ff.
 - Friedel-Crafts reactions 57ff.
 - iodinations 66ff.

b

- beads
 - catalyst 7f., 18f., 63
 - glass 63
 - multicomponent polymer-based 301
- bioactive material 383
- biocatalytic
 - hydrolysis 48
 - transformation 49
- biochemistry 15
- biopolymer
 - biocompatible polymer matrix 313
 - versatile 383
- biotechnology 37
- block-heating 5, 7f.
- buffer streams 316

c

- CAD model 30f., 36, 38
- capillary number 291, 327, 350
- catalyst
 - activity 6
 - coatings 7, 169, 421ff.
 - Co/SiO₂ 11
 - Cu/CeO₂/Al₂O₃ 423
 - Cu/ZnO 413, 423f.
 - Cu/ZnO/Al₂O₃ 423
 - efficiency 460
 - heterogeneous 4f., 7, 17, 167, 169f., 407
 - homogeneous 17f.

- immobilized 18
- integration 25
- honeycomb structure 181
- loading 8
- Ni/Al₂O₃ 151
- Ni/SiO₂ 11
- Pd/Al₂O₃ 8f., 151
- Pd/C 160
- Pd/SiO₂ 99
- pellet 460
- productivity 180f.
- PrOx catalyst screening 482f.
- Pt 172, 174
- Pt/Al₂O₃ 8f., 149
- retainers 7
- Rh/Al₂O₃ 8f.
- Ru/C 8
- solid 144, 148, 170
- surface 6, 10, 175f.
- surface area 9, 174
- thin-film 8ff.
- traps 180
- water-soluble 153
- zeolite-based 6
- catalytic autothermal reforming (CAR), *see* SR
- catalytically active materials 453ff.
- additional catalyst supports 457ff.
- microstructure walls 455ff.
- cation pool
- initiated polymerization 233, 236
- method 58, 114
- cell
- biological cell structure 320
- immobilization 247
- cellular material 383
- ceramic
- γ-Al₂O₃ 7
- alumina 34
- coatings 34f.
- custom-built block 5
- devices 33ff.
- foams 460ff.
- manufacturing, *see* manufacturing technologies
- monolith 455ff.
- sealant 35f.
- Si₃N₄ 12f.
- SiO₂ 7
- tape casting 460
- thermal expansion coefficient 35f.
- zirconia 34
- CFD simulations 172, 179, 210, 484, 488
- chain breaking reactions
- chain transfer 214, 216, 218, 229f., 237
- termination 199f., 213f., 216f., 237f.
- chemical microprocess engineering 384
- chemiluminescence 113
- chemisorption 11
- chemistry
- combinatorial 16, 74, 115, 253f.
- diazotization 71
- macroscopic 66
- organic 17f.
- synthetic 15
- chromatography 18
- GC-MS (gas chromatography-mass spectroscopy) analysis 53, 81
- gel filtration chromatography (GFC) 251f.
- on-line 102
- size-exclusion (SEC) 203
- coalescence 325, 327
- milk homogenization 389f.
- coating
- dip 34
- sol-gel 7f., 11, 34f., 425, 458, 472
- spin-coating 308
- wall 144
- wash-coating 7, 10, 34, 457ff.
- combustion
- autothermal butane 13
- catalytic 410f., 413, 416, 457
- homogeneous 410f.
- methane 427
- methanol 430ff.
- consumer goods industry 363ff.
- microreactors for analytical tasks 390ff.
- microreactors for emulsification 364ff.
- screening applications 380
- conversion 66, 84
- aqueous Kolbe-Schmitt 72f.
- CO 466, 472, 485ff.
- cyclohexane 173ff.
- homogeneous 456
- propane 172f.
- quantitative 55, 81, 154
- rate 61
- coupling reactions 99ff.
- cross-coupling 193
- diazotization/Suzuki-Miyaura 101
- homocoupling product 124
- Kumada-Corriu 99
- metal-catalyzed cross-coupling 99
- Mizoroki-Heck 100f.
- oxidative homocoupling 120
- photochemical 104ff.
- Sonogashira 99f.
- Suzuki-Miyaura 99, 101
- cream

- flow rate 390
- formation 371f.
- screening of cream formulations 380f.
- thixotropic 371
- custom-built block 5
- CYTOS microreaction system 50, 103

- d**
- Damköhler number 492
- dehydrogenation
 - catalysts 170
 - heterogeneous catalytic 170ff.
 - microreactor configurations 168ff.
 - oxidative 9, 172
 - Pt-catalyzed 10
- deposition
 - magnetron sputter 10
 - physical vapor 9
- deprotection 152
- detergent production 384f.
- diffusion
 - barrier 456
 - bonding 32, 36, 438
 - coefficients 210f.
 - constant 15
 - gas-liquid 180
 - length 61
 - liquid-liquid 250
 - path 110, 174
 - pure 370
- dispersion 274
 - adhesive technology 376
 - cosmetics 375
 - foods 376
 - liquid-liquid 366f., 375f., 379
 - microdispenser 368
 - pharmaceuticals 375
 - processes 365f., 370
 - surfactant 377ff.
 - toluene-in-water 382
 - vesicular 376f.
- droplet
 - agglomeration 389f.
 - coalescence 389f.
 - coefficient of variation (CV) 347, 350, 352, 354
 - core-shell 352f., 382
 - deformation 327f.
 - diameter 316f., 327, 339, 367, 371
 - disintegration processes 330
 - disruption theory 327f., 389
 - double droplet layer 316
 - emitters 370
 - forces 330
- formation 330, 333f., 339
- interface 325
- jetting 334, 354
- mobility 326
- relaxation time 328
- size 315, 319, 325, 335, 339, 371
- viscosity 328
- dyes, *see* organic particles

- e**
- electrochemical
 - microflow cell 115ff.
 - paired microsystem 117
 - microflow process 117
 - potential 278
- electrode
 - counter 113f.
 - inter-electrode gap 124
 - plate-to-plate 113
 - surface area 115
 - working 113f.
- electrolyte 113, 115, 118, 379
 - free electrochemical system 115f.
 - supporting 117
- electron-withdrawing group 134
- electroosmotic flow (EOF) 81, 91
- electrophiles 102ff.
- electrophoresis 48, 113
- electropolishing 29
- emulsification
 - applications 355
 - devices 329, 331ff.
 - high-pressure homogenization nozzles 332f., 337
 - industrial 329
 - macro mixers 336
 - membranes 332f., 347f.
 - microchannel (MC) systems 332, 348ff.
 - microengineered mixers 335f.
 - microporous systems 320, 332
 - processes 331, 364f.
 - simultaneous mixing and homogenization (SMH-valve) 337f.
 - three-dimensional (3D) coaxial microcapillary systems 352ff.
 - two-dimensional microfluidic systems 350ff.
 - two-step 349
- emulsifier 371f.
- emulsion 144
 - active ingredients 375
 - additives 375
 - aging effects 373
 - colloid technique 458
 - creaming 325f.

- double 314, 320f., 333, 346, 349, 351
- emulsification process 327
- fat-water 336
- macroemulsions 325
- microemulsions 325ff.
- miniemulsions 325
- monodisperse multiple 347, 394f.
- multilayered 345, 352f.
- oil-in-water (O/W) 325ff.
- oil-in-water-in-oil (O/W/O) 345, 351
- pickering or particle-stabilized (PSE) 326
- polymerization reactions 220
- rheological properties 326
- shear mixing 346
- single 314
- soap-free 372
- solid-in-oil-in-water (S/O/W) 349
- stability 372f., 374
- stabilization 325ff.
- water-in-oil (W/O) 314, 317f., 325ff.
- water-in-oil-in-water (W/O/W) 314, 345f., 348ff.
- enantiomeric
 - conformation 19
 - excess 48f., 152
- enantioselectivity 48
- endothermic
 - catalytic steam 11
 - reaction 13
- enthalpy reaction 205f.
- enzyme
 - immobilization 246f.
 - immobilized magnetic microparticle (EMMP) 120
 - immobilized microbead-supported 119f.
 - microbead-supported 119
- etching 15
 - chemical 26f.
 - deep reactive ion (DRIE) 26, 451, 492
 - lamination process 27
 - metals, see manufacturing technologies for metals
 - photochemical 438
 - wet chemical 36
- exchange rate 133
- exhaust gas treatment 387f.
- exothermic reaction 8, 11f., 50, 52
- nitrations 60
- sulfonation of toluene 385ff.
- extinction 8

- f**
- feed flow rates 380
- flow
 - annular 178
 - cation 114ff.
 - co-current 426
 - co-flowing laminar streams 308
 - concentric laminar 247f.
 - continuous 251, 295, 373
 - counter-current 410
 - distribution 6f., 148, 370
 - electroosmotic 20
 - focusing 290f., 298ff.
 - gas-liquid 178f.
 - gravity-driven liquid 144
 - internal circulation 62f.
 - laminar 246, 328, 330
 - laminar elongational 330
 - laminar shear 329f.
 - map 316
 - microflow through processes 279ff.
 - multilayered laminar 122, 246, 251
 - multiphase 177f., 181
 - organic/aqueous laminar 106
 - organic/aqueous/organic three-layer 121
 - organic/aqueous two-layer 121
 - partial 373
 - pattern 369f.
 - pipe 131f.
 - pressure-driven 54, 114, 144
 - pulse 181
 - rate 50, 52, 54, 62, 76, 104, 238, 379, 382
 - rate ratios 379, 382
 - segmented 71f., 284f.
 - slug 63, 132, 181
 - Taylor 144, 148, 151, 154, 178ff.
 - transitional 180
 - three-layer 76, 106, 121, 247
 - total flow rate 366f., 371, 379
 - turbulent 251, 328f.
 - two-layered laminar 246f.
 - two-phase 177f., 180
 - two-stage continuous microflow system 104, 106
 - velocity 317, 334
 - volumetric flow ratio 366f.
- fluidic
 - density 291
 - stability 53
- fluorescence microscopy 301, 306f., 316
- fluorination 131ff.
- directed 135
- selective 161f.
- foam 34, 274, 375, 460f.
- FeCrAlY metallic 415
- silicon carbide 449
- force

- dynamic lifting 330
- elongational 368
- gravitational 179, 182
- impetus 330
- inertia 179, 328, 389
- internal viscous 328
- shear 389
- surface parallel resisting 330
- FRP (free-radical polymerization) 199ff.
- butyl acrylate 204ff.
- initiation 215f.
- mechanism 215ff.
- microreactors 204
- microsystems 202ff.
- propagation 216
- styrene 206, 209f.
- termination 216
- FTIR spectrometer 114
- fuel cells 405, 408ff.
 - PEM (proton exchange membrane) 409, 411, 413, 415, 466
 - SOFC (solid oxide fuel cells) 421
- fuel conversion 405ff.
 - integrated plant concepts 411ff.
 - operation of microreactors 407ff.
 - power range 405f., 428ff.
 - steam reforming, *see* SR
- fuel processors
 - design concepts for fuel cells 426ff.
 - efficiency 409, 417f., 428
 - gasoline 415, 489
 - preferential oxidation in integrated 486f.
 - MEMS-based (micro electro mechanical systems) 413f.
 - methanol 405f., 428ff.
 - natural gas 415
 - off-gas 408f., 430
 - portable 405, 433, 488
- fuel vaporization 416
- functional materials 259ff.
- functionalization 104

- g**
- gas clean-up 405, 409, 415f.
 - CO 465f., 479f.
- gas hourly space velocity (GHSV) 453, 459, 483ff.
- gas phase ignition 461f.
- gelation 383
- glass
 - bonding 36
 - ceramic sealant 35
 - devices 36ff.
 - Foturanc 36
- manufacturing, *see* manufacturing technologies
- microreactors with in-plane interface 14
- Shirasu porous (SPG) 347f.
- UV-sensitive 11

- h**
- heat
 - dissipation 181
 - generation 410f.
 - lower heating value (LHV) 408f., 418, 434
 - of combustion 409
 - of reaction 408
 - recovery efficiency 489
- heat transfer 4, 52, 63, 148, 153, 233, 408
- heat transport 15, 495
- high-resolution electron energy loss spectroscopy (HREELS) 175
- high-throughput
 - experiments 15f.
 - microfluidic polymerization 253f.
 - synthesis 49
- homogenization
 - conventional 390f.
 - novel 391
 - of dairy products 389
 - of milk 389f.
- hydrocarbons 407f.
- hydrodynamic 148
 - focusing 316, 376
- hydroformylation 153
- hydrogen
 - conversion 11
 - mass transfer coefficient 149, 157
 - permeation 11
 - production 405f., 409, 416f.
 - purification 11
 - selectivity 410
 - yield 408, 410
- hydrogenation 149f., 152ff.
 - asymmetric heterogeneous 157
 - asymmetric transfer 123
 - catalysts 170
 - cyclohexene 149f., 181
 - gas-liquid asymmetric 152
 - gas-liquid-solid 6
 - gas-solid 143
 - heterogeneous catalytic gas-phase 170ff.
 - microreactor configurations 168ff.
 - multiphase 176ff.
 - Pd-catalyzed 6, 15
 - selective liquid-phase 157, 170
- hydrophilic 8
 - cream 371

- microchannel 352
- stream 308, 310
- surface of SPG 347
- hydrophobic 282
 - microchannel 352
 - solution 308
 - stream 310
- hydroxylation 119f.

- i**
- ignition 8
- impregnation 10
- IMRET (International Conferences on Microreaction Technology) 364
- infiltration 7f.
- inorganic particles, *see* nanoparticles
- initiator 200
- injections 152
- in-situ reaction 55, 66, 71
- interface
 - gas-liquid 144, 157
 - laminar flow 246
 - liquid-liquid 70, 250
 - oil-water 75f.
 - shearing 181
 - water-oil-water 76
- ionic liquid 100
- IR-spectroscopy 49
- isothermal 172

- k**
- kinetic
 - of catalytic reactions 4
 - quenching of radical chain mechanism 15
- Knoevenagel condensation 17, 92ff.

- l**
- lab-on-chip 391
- lamellae 370
- laser
 - ablation 29
 - IR diode 118
 - machining 29
 - patterning 36
 - selective laser melting (SLM) 30f., 34, 38
 - welding 475
- layer
 - by-layer 38
 - multiple mask 33
 - oxygen inhibition 291
 - porous 34
 - spin-on-glass (SOG) 410
- liposome 313, 376
 - mean diameter 317
- number of encapsulated molecules 376
- self-assembly 316, 376
- size 376f.
- liquid-phase organic chemistry 15
- lithography
 - projection lithography 307ff.
 - soft 16, 306
- low-energy electron diffraction (LEED) 175
- LRP (living radical polymerization) 213ff.
- atom transfer radical (ATRP) 213, 217, 219ff.
- degenerative chain transfer 218
- dissociation-combination 217
- fabrication of microfluidic devices 222
- mechanisms 217ff.
- nitroxide-mediated (NMP) 213, 217ff.
- reversible activation 217ff.
- reversible addition-fragmentation chain transfer (RAFT) 213, 218, 220f.
- tubular reactors 221f.

- m**
- manifold 6f.
- exhaust 11
- flow distribution 6
- reaction 9f.
- T-shaped inlet 210
- manufacturing technologies 25
 - abrasive techniques 25
 - alignment 33
 - assembling 32
 - bonding 32f., 36, 39
 - clamping 36
 - embossing 31, 37
 - etching 26f.
 - generative techniques 25
 - gluing 36, 39
 - injection molding 37
 - joining 35, 39
 - laser machining 28, 33, 38
 - mechanical precision machining 28, 31, 33, 38
 - metals 26ff.
 - microstereolithography 38
 - punching 26f., 31
 - sealing 35, 39
 - selective laser melting (SLM) 30f., 34, 38
 - soldering 36
 - solid free-form 33
 - spark erosion technique 27ff.
 - welding 39
- mass spectrometer (MS) 174
- mass transfer 62f., 112, 148, 174, 180
 - coefficients 62, 144, 148f., 153, 158, 179f.

- efficiency 131
- gas-liquid 178ff.
- interface 62
- limitations 158
- rate 4, 6, 159, 182
- mass transport 15
 - gas-liquid 178
- mechanical decoupling zones 12
- mechanical stress 12
- membrane 10ff.
 - bilayer 376
 - chemically functionalized polymer 121f.
 - cylindrical 247f.
 - dual-membrane structures 121, 246f.
 - flat 12
 - inner-channel 121, 247
 - lipid 17
 - non-permeable 11
 - Pd permeation 10
 - permeable porous silicon 10
 - permeation 11, 347
 - (phospho-)lipid bilayer 313
 - polymer membrane synthesis 246ff.
 - separation 410
 - SiN 12
 - spacer 116
 - surface 121
 - transmembrane pressure drop 330f.
- metal 26ff.
 - -/catalyst conjugates 172
 - custom-built block 5
 - foam 489f.
 - microlith 459
 - microstructured monolith 461f.
 - FeCrAlloy monolith 457, 462
 - manufacturing, *see* manufacturing technologies
 - microreaction unit 51
- methanation
 - activity 475
 - catalysts 470, 475
 - reaction 465f., 470f.
 - selective 475
 - synthesis gas 10
- microbubbles 144, 274
 - satellite 178
- microchannels
 - alginate gelation 383f.
 - bifurcated inlet 7
 - blocking 264
 - chip 105, 114
 - cross-junction 314, 316f., 376
 - cross-section 366f.
 - downstream 370
 - emulsification 314, 319
 - fork-shaped 373
 - fouling 264, 282
 - I-shaped 12
 - Magnus effect 284
 - microfluidic 13, 70
 - micromachined reaction 5
 - mixing 8
 - packed-bed 6
 - parallel 6f., 9f., 11, 19, 53
 - patterning 416
 - plate design 460
 - pressure drop 7, 370, 373, 389f.
 - Pt-layer 10
 - quenching 8
 - serpentine-shaped 6, 10f., 15
 - single 6
 - size 172
 - three-dimensional microchannel circuit 16
 - T-shaped 6, 12, 179, 383f.
 - upstream 370
 - wall 6, 20, 120, 149, 151
- microencapsules
 - biological species 318f.
 - efficiency 318f.
 - lipid 313, 319
 - multilayered 352
 - polymeric 313ff.
 - solid-in-oil-in-water (S/O/W) pectin 314, 349
- microencapsulation process 381
 - chemistry 382
 - interfacial polymerization 381f.
- microfabrication plant 13
- microfluidic dehydration 89f.
- microfluidic devices 260
 - chemical sensing of flavors and fragrances 391f.
 - flow focusing device (MFFD) 290f., 298ff.
 - flow-through ultrasonic cell 318
 - LRP (living radical polymerization) 222
 - microflow-through devices 285f.
 - microsystem-controlled polymerization technology (MCPT) 232ff.
 - monodisperse double emulsions synthesis 394f.
 - polymer bead necklaces synthesis 393f.
 - projection lithography device 307ff.
 - sheath-flow (SFMD) 303ff.
 - T-junction microchannel device 290, 294ff.
 - terrace-like microchannel device 292f.
 - 3D 320

- two-dimensional microfluidic systems 350ff.
- microfluidic networks 15f., 370
- flow system 71
- integrated 15
- set-up 76f.
- micromixer
 - caterpillar (CPMM) 66, 102, 366f., 378f.
 - caterpillar split-recombine microstructured 336f., 366, 368ff.
 - cream formation 371
 - *in silico* 373
 - integrated 16
 - interdigital 371, 381
 - multilamination 58f., 93, 103, 378f.
 - recombination-type 234
 - slit interdigital 318
 - specific energy input 367f.
 - static 15, 374
 - triangular interdigital 66
 - T-shaped 104, 191, 237f., 240, 338
- micromixing
 - chaotic mixing effect 178
 - controlled polymerization 236
 - efficiency 238, 249, 251
 - energy 365, 367f.
 - free-radical polymerization processes 202
 - multilamination 267
 - multi-step 281, 369
 - time 365
- micropores 330
- diameter 347
- membrane 331
- microreactor
 - alcohol steam reforming 427ff.
 - applications for fuel conversion, *see* fuel conversion
 - applications in the consumer goods industry 363ff.
 - batch 18, 102, 105, 111, 160
 - bilamination 209f.
 - capillary slug-flow 61f., 75, 102, 123, 148, 153
 - catalyst-trap 160
 - catalytic-plate 426
 - catalytic wall 453ff.
 - ceramic microflow electrochemical (CEM) 113f., 170
 - continuous-flow 18
 - design 4f.
 - differential packed-bed cross-flow 7
 - double-injector 72
 - enzyme 18f.
- falling-film 137, 144, 149, 152, 154, 169, 386
- fixed-bed 160, 171f., 181, 187, 423f.
- foam contactors 148
- four-channel microstructured flow 81
- glass 6, 11, 14, 16, 18, 20f., 50, 52, 54f., 86, 105, 148, 154
- glass/quartz 168
- /heat exchanger 13, 38, 158f., 365, 377, 386, 416, 490
- heat-shielded 458
- helicoidal falling film 152
- HEx 159
- high-pressure 14f., 73
- high-temperature 7ff.
- high-temperature water gas shift (HT-WGS) 416
- hydrogen production 417f.
- laboratory-scale 171f.
- large-scale 202
- low-temperature 5f.
- low-temperature water gas shift (LT-WGS) 416
- membrane 12, 169, 171
- metal/alloy 49, 168f., 187
- microchannel 171f., 174, 488, 492
- microflow 81f., 84ff.
- microfluidic chip 48, 75
- micromixer/tubular 102, 104, 152
- microstructured 459f., 465, 470ff.
- microtube 206
- milli-structured 153
- monolith 148, 151, 456ff.
- multichannel membrane 112, 134
- multilamination 209ff.
- multiple-channel 148f.
- nine-channel 134f.
- non-isothermal model 495ff.
- numbering-up 206ff.
- packed-bed 6f., 157, 160, 171, 181, 451f.
- phase transfer 50f.
- plate heat exchangers 431ff.
- polymer 37ff.
- preferential oxidation (PrOx) 410, 414f., 479ff.
- protein-immobilized 247
- Pyrex glass pile-up 53, 452
- silicon-based 10, 14f., 20f., 169
- (100)-silicon/Pyrex 6
- silicon/quartz 104
- single-channel 132, 134, 148f., 151ff.
- single-tube 161
- split-and-recombine 63
- steam reformer/evaporator/burner 429ff.

- stirred tank 47, 151, 179
- suspended-tube 13
- three-channel 132ff.
- throughputs 31, 49, 51, 53, 71, 148
- trickle-bed 151
- tube heat exchanger 103
- tubular reactors 221f., 234, 237, 240
- volume 50, 115
- microsensors** 405
 - CO 10f.
- microwave**
 - assisted microflow systems 101
 - irradiation 75
- miscellaneous reactions** 187ff.
- carbonylation 191ff.
- dehydration 187f.
- Fischer-Tropsch synthesis 190f.
- phosgene synthesis 188f.
- molecular weight**
 - control 222, 229, 233ff.
 - distribution 205f., 229, 232ff.
 - number-average 209, 252

n

- nanoparticles** 274ff.
 - application in microreactors 285
 - colloid 8
 - concentration 284
 - dielectric 274
 - metal 276
 - polymer 274
 - semiconductor 275
 - transport conditions 284f.
- NMR spectrum** 236, 239
- nucleation** 264, 278
 - rate 279
- nucleophilic** 230, 233f.
- numbering-up** 206f., 365, 377

o

- ohmic drop** 112
- Ohnsorge number** 328
- organic particles** 259ff.
 - breakdown method 261
 - buildup method 261f.
 - colorants 260, 265, 268
 - dyes 260, 266, 268
 - inks 264f.
 - pigments 260, 265ff.
 - polymer-analogue dyes 267f.
 - synthesis 261ff.
- Ostwald ripening** 325
- oxygen recycle** 387f.
- oxidation**

- ammonia 12
- anodic 34f.
- autothermal reforming (ATR) 408, 426f., 445f.
- Baeyer-Villiger 112
- catalytic partial (CPO) 8f., 405, 407, 417, 426, 445ff.
- chemical 109ff.
- continuous selective 112
- electrochemical 112ff.
- heterogeneously catalyzed 387
- miscellaneous 122f.
- Moffatt-Swern 109ff.
- non-catalytic partial (POX) 445f.
- one-electron 115
- preferential (PrOx) 479ff.
- preferential oxidation kinetics 480f., 493ff.
- Rh-catalyzed direct partial 13
- selective (SELOX) 143, 409, 466
- oxidative**
 - homocoupling 120
 - steam reforming (OSR) 405, 407, 417, 446, 449ff.

p

- parameter screening** 66
- particle**
 - adsorption of dispersant 265
 - flocculation 264, 325
 - growth 264f., 278f.
 - sedimentation 264
- particle size** 265f., 279
- distribution** 260, 264, 267, 294, 308f.
- Peclet number** 210f.
- phase inversion** 299, 325, 346
- temperature (PIT) 332
- phase-transfer** 16
- phospholipid molecules** 376
- photocyanation** 105f.
- photoinduces electron transfer process** 75f.
- photoinitiation** 66
- photolithography** 5, 15
- pigments**, *see* organic particles
- polarization microscopy** 301
- polycondensation** 245ff.
- interfacial 246
- synthesis of solid materials 248f.
- polymer**
 - biopolymer 252f.
 - device 37ff.
 - manufacturing, *see* manufacturing technologies
 - microfluidic chips 76
 - microstructure walls 38

- photosensitive polymer mask 26
- polymeric coupling component 267
- porous 116
- polymer particles 289ff.
 - amphiphilic biphasic 308
 - bead necklaces 393f.
 - biconjugation 301
 - core-shell 300ff.
 - emulsification technique 290f., 297, 300, 305, 307
 - diameter 291
 - Janus 300f., 303f., 306
 - molecular imprinted polymers (MIPs) 294, 296f.
 - non-spherical 294, 296
 - plug-shaped 296
 - projection photolithography technique 291f., 307ff.
 - shape anisotropy 306
 - synthesis 393f.
 - ternary 300f., 303
 - terrace-like microchannel 292f.
 - T-junction microchannel 294f.
- polymerization 38, 151, 199ff.
 - activation-deactivation 217
 - addition technique 199
 - amino acid 249ff.
 - anionic polymerization technique 213
 - atom transfer radical (ATRP) 213, 217, 219ff.
 - cap 217
 - carbocationic intermediates 230ff.
 - cation stabilization 230ff.
 - cationic 229ff.
 - controlled/living cationic 230ff.
 - copolymer 214f., 221ff.
 - crosslinking 247ff.
 - dormant state 217
 - free radical, *see* FRP 199ff.
 - homopolymerization 221f.
 - iniferter (*initiator transfer agent terminator*) 215
 - interfacial 247, 249, 381f.
 - living radical, *see* LRP
 - microencapsulated Pd 151
 - micromixer-assisted 203f.
 - monomer: initiator ratio 238f.
 - nitroxide-mediated (NMP) 213, 217ff.
 - number-average chain length (NACL) 200
 - photoinduced 289, 299f.
 - polydispersity index (PDI) 200f., 205, 209f., 222f., 251ff.
 - propagation 200, 207
 - propagation reaction enthalpy 205
 - proton acid-initiated 236
 - quenching 204
 - quinone transfer radical (QTRP) 218
 - rate 200
 - reversible activation 217ff.
 - reversible addition-fragmentation chain transfer (RAFT) 213, 218, 220f.
 - solution-phase 249ff.
 - stable free radical (SFRP) 218
 - thermally induced 289
 - weight-average chain length (WACL) 200
 - Ziegler-Natta 241
- positron emission tomography (PET) 48, 193
- precursors 8, 263
- pressure swing adsorption (PSA) 479
- printed circuits boards (PCBs) 5
- process
 - batch 58, 65, 103, 265f.
 - large-scale 120, 206, 209
 - intensification 57
 - laboratory-scale 171, 203, 265f., 269, 365
 - macrobatch 132
 - one-pass 387
 - optimization 57
 - pilot-scale 102, 157, 203, 266f., 365
 - plant scale 365
- product quality 365, 373, 379
- production
 - customer-based 374
 - liquid detergent 377ff.
 - mass 37f.
 - series 31, 37
 - small-scale on-demand 13
 - technical-scale 268
- proteins 313, 319
- prototyping technology 30f., 38
- purification 52, 54, 63, 91, 167, 409
- Prummerer rearrangement 109
- pyrolysis 8, 263
- q**
- quasi steady-state approximation (QSSA) 200
- r**
- radicals reactivity 199
- radiochemistry 54
- Rayleigh instability 334
- reaction
 - addition, *see* addition reaction 81ff.
 - addition-elimination 90ff.
 - adsorption 493
 - aliphatic substitution, *see* aliphatic nucleophilic substitution

- aromatic substitution, *see* aromatic substitution
- asymmetric transfer hydrogenation 123
- autocatalytic mono-nitration 65
- Baylis-Hillman 91f.
- batch 84, 112
- biphasic 48, 50
- brominations, *see* aromatic substitution
- catalytic partial oxidation 4, 11
- chlorination 138f.
- competitive consecutive 232f.
- continuous flow 84
- coupling, *see* coupling reactions
- cyanation 114
- Diels-Alder 14, 93f.
- efficiency 115
- elimination 89f.
- enzymatic 19, 118f., 122, 246
- Fischer-Tropsch 10, 452
- fluorination 131ff.
- Friedel-Crafts reactions, *see* aromatic substitution
- gas-phase 11, 15
- gas-liquid 131ff.
- gas-liquid-liquid 157
- gas-liquid-solid 148
- Grignard exchange 102f., 233
- Heck aminocarbonylation 14
- heterogeneous catalytic 5, 144
- homogeneous 15, 64
- Horner-Wadsworth-Emmons 91f.
- interfacial polycondensation 121f.
- iodinations, *see* aromatic substitution
- Kolbe-Schmitt 72f.
- liquid-phase 14f., 47ff.
- liquid-liquid-phase 47ff.
- lithium halogen exchange 102ff.
- methanation 465f., 470f.
- miscellaneous 187ff.
- multistep 119
- nitrations, *see* aromatic substitution
- phase transfer 50f.
- photochemical 36, 86f., 138
- photocyanation 75f.
- preferential (PrOx) 479ff.
- rate 17, 65
- regioselective mono-nitration 63ff.
- Reimer-Tiemann reaction, *see* aromatic substitution
- Sandmeyer 76f.
- sequential 62
- side- 109, 111, 158, 177, 216, 230
- stopped flow 84
- substitution 131ff.
- sulfation 387
- sulfonation 385ff.
- triphase 6
- Wittig 90f.
- reagent
- Grignard 86, 102
- H-transfer 153
- organolithium 102
- organometallic 102ff.
- redox transformations 112
- reduction
- electrochemical 123
- two-electron-two-proton 115
- reflectance spectra 69
- residence time 4, 15, 17, 50, 62, 461
- reagent 47, 49, 52
- Reynolds number 291, 350

- s**
- scale-out 132, 149
- scale-up 71, 111, 133, 148f., 151, 160, 203, 206f., 262, 269
- -/scale-out 13
- selectivity 9, 58, 110f.
- benzene 173ff.
- cyclohexane 175
- enantio- 157
- hydrogen 11
- mass transfer effect 158
- para 70
- product 171f., 233
- quantitative 154
- salt-impregnated packed beds 7
- temperature gradient effect 161
- SEM (scanning electron microscopy) 31, 297f., 309
- shear
- forces 368, 389
- rate 366
- shelf-life stability 389
- silicon
- pillars 8
- porous 7, 11, 19
- processing technique 33, 169
- technology 413
- solder-based sealing technique 14
- solid-phase chemistry 18
- SR (steam reforming)
- alcohol steam reforming in microchannels 422ff.
- catalytic autothermal reforming (CAR) 408, 415f., 446
- diesel 437
- gasoline 406

- hexadecane 426
- hydrocarbon 435ff.
- hydrogen 425f.
- methanol 406, 412ff.
- octane 438
- oxidative (OSR) 405, 408, 417
- propane 425
- reaction system 421f.
- steam-to-carbon ratio (S/C) 421, 423, 428
- stress
 - mechanical 12f.
 - tensile 36
 - thermo-mechanical induced 12
- substrate 18
- permeation 246
- sulfonation 385ff.
- supercritical fluids 15
- surface
 - active molecules 280
 - area-to-volume ratio 4, 15, 112, 182, 222, 233, 273
 - roughness 26
 - selective approaches 8
 - specific surface area 260
- surfactant 294, 307f., 314, 379f.
- dispersion 377ff.
- molten 377
- oil-surfactant mixture 315
- production 385
- synthesis
 - azo dye 71f.
 - batch 73
 - bio-related compounds 20
 - combinatorial 115, 253
 - continuous sequential combinatorial 114f.
 - continuous serial combinatorial 114f.
 - direct 161
 - electrochemical 113, 115
 - evaporation 313, 317
 - extraction 313, 319
 - fluorinated material 91
 - gelatin 314
 - gram-scale 88f.
 - Hantzsch 93
 - hydrothermal 263
 - Knorr 93
 - multi-step solution-phase 20
 - one-pass synthesis of SO₃ 387f.
 - organic 99
 - PASS (polymer-assisted solution-based) 91f.
 - peptide 21
 - photochemical 104
 - pigment 265f.
 - polymerization 38, 151, 199ff.
 - precipitation 263f., 274
 - sequential library 74
 - sol-gel 263
 - thermal activation 274, 285
 - two-step 71
- t**
- temperature
 - control 102, 118
 - equilibrium temperature coefficients 4
 - gradient 161, 172
 - ignition 4
- temperature-sensitive thermochromic liquid crystals (TLCs) 69
- termination 199f., 213f.
- transition metal complex 217, 219
- u**
- UV
 - absorption 17
 - induced-photopolymerization 294, 299
 - irradiation 36, 291, 294, 299
 - on-line UV analysis 104
 - pulsed UV laser 36
 - visible (UV-VIS) spectroscopy 74, 315
- v**
- velocity
 - gradient 178
 - liquid hourly space (LHSV) 180
 - micron-resolution particle velocimetry (μPIV) 179
- vesicles 320
 - formation 376f., 379
 - size distribution 377, 379f.
- viscosity
 - aqueous phase 373
 - fluid 291
 - high-viscosity liquids 368
 - oily phase 373
 - polymer 201, 207, 223
 - ratio 368
- w**
- water gas shift reaction (WGS) 406, 409f., 446ff.
- catalysts 468f.
- high-temperature (HT-WGS) 416, 465f., 468f.
- kinetic analysis 473, 475
- low-temperature (LT-WGS) 416, 465f., 468f.
- temperature range 468f.
- Weber number 327ff.

weight hourly space velocity (WHSV) 423,

427, 494, 497ff.

Weitz-Prater parameters 491f.

x

X-ray photoelectron spectroscopy (XPS) 175

y

yield 50, 110f.

– benzene 175

– quantitative 151, 237

– radiochemical (RCY) 54

– space-time (STY) 152, 158, 180