

Index

A

Abidor, I.G., 3, 8, 11, 14
Abram, F., 52–53
Abu-Arabi, M.K., 219
Acrylamide, 100
Adenosine diphosphate (ADP), 86
Adenosine triphosphate (ATP), 86
Ade-Omowaye, B.I., 18, 68–69, 70, 200
Agarwal, A., 43
Aguilera, J.M., 70, 74, 108, 110, 113–114, 220
Aizawa, M., 104
Al-Asheh, S., 150
Albagnac, G., 54, 59
Algae (*Chlorella vulgaris*), 199
Alginate gels
 electrical treatment on mechanical properties, effect of, 104
 influence of, on weight loss during electrification, 103–104
 structural changes, 104–105
Alkimov, A.P., 221
Allen, M., 183
Almdal, K., 99
Altunakar, B., 186
Amami, E., 68–69
Ammonium persulfate, 100
Anaerobic degradation, 206
Andre, F., 7
Anderson, G.L., 6
Angersbach, A., 9, 18, 39, 45, 47, 193, 196, 200, 202, 253
Antioxidant substances, 195
Aouida, M., 24
Apple juice processing, 194
Aqueous extraction from oilseeds, 217–220
 extraction enhanced by HVED, 225–226
 extraction of soluble molecules, 226–230

 oil extraction, 230–233
 quality of extracted products, 226
 high-voltage electrical discharges, 220–221
 condition of apparition, 221–222
 material and energy, 222–224
 steps of creation, 221
 for various applications, 224–225
 stages, 220
Aqueous extraction of solutes from food plants, 62–68
Araki, C., 102
Archie, G.E., 45, 72
Archie's exponent, 72
Armisen, R., 105
Aronsson, K., 52–53
Atrualiyev, D.N., 18
Axelsson, L.T., 85
Ayhan, Z., 186, 189
Ayres, R.A., 225

B

Bacillus licheniformis, 170
Bacteria and yeast, electroporation of, 18–19
Baird, J.K., 102
Bajgai, T.R., 70
Balasa, A., 181, 195–196, 198, 202
Balke, D.T., 219, 230
Bansal, B., 192
Barbosa-Cánovas, G.V., 39, 70, 97, 186, 189
Bargeman, G., 172
Barrau, C., 10–11
Barskaya, A.V., 220, 223, 226–227
Barsotti, L., 39, 203
Barton, W.A., 145, 148
Bayraktar, H.T.P., 20
Bazhal, M.I., 46–48, 54, 56, 193–194
Beattie, J.M., 183
Beaudry, C., 70
Beckett, S.T., 219

- Belatain, 199
 Belkin, G.S., 243
 Bellara, S.R., 169
 Bendicho, S., 186, 190
 Bennion, M., 100, 107
 Benz, R., 88
 Berg, H., 10
 Bernhardt, J., 43
 Betanin extraction, food industry and, 108–111
 Beutner, R., 96
 Beveridge, J.R., 9
 Beveridge, T.J., 23
 Bhatti, R.S., 219
 Biedinger, U., 20
 Biliaderis, C.G., 219
 Bilska, A., 4
 Bioactive peptides, 172
 Biodiesel, 197
 Biological tissues with pulsed electric fields, 237–238
 emerging industrial applications
 grapes, 260–264
 green biomass by electroporation
 assisted dewatering, 264–268
 sugar beets, 255–260
 pulse generators for industrial applications
 burn-up control scheme, 249–252
 generator configurations, 238–242
 screening of the degree of electroporation, 252–255
 spark gap switches, 242–246
 synchronization, 246–249
 Biomass sludge, 148
 Bioseparation, 156
 Bisacrylamide, 100
 Blangero, C., 23
 Block, L.H., 107
 Bluhm, H., 218, 237, 239, 245–246, 249, 254
 Borda, J.C., 243, 246, 252
 Bourne, M.C., 111
 Bouzrara, H., 54–57, 196, 255
 Bovine Immunoglobulin G, 191
 Bovine serum albumin (BSA), 171
 Bozan, B., 219
 Braakman, L., 186
 Brandinsky, K., 15
 Brant, D.A., 164
Brassica oleracea, see Kohlrabi
 Braudo, E.E., 108
 °Brix of sugar beet juice, 64
 Browning inhibitors, 112–113
 Brunstedt, J., 88
 BSA, see Bovine serum albumin (BSA)
 Bureau, M.F., 7
 Burkes, T.R., 221
 Burn-up control scheme, 249–252
 Bustard, M.T., 18
C
 Calderon-Miranda, M.L., 190
 Calvert, P., 107
 Canatella, P.J., 4–5, 14, 41, 44, 51
 Cao, W., 70
 Carlson, V.S., 91
 β -Carotene, 196
 Carpita, N., 23
 Carstensen, E.L., 86
 Castro, A.J., 190
 Čegovnik, U., 21
 Cell cytoskeleton, 23
 Cell membrane, 3
 electroporation, 2
 fluidity, 22
 fusogenic state, 3
 Cellular tissues, electrically induced damage in
 damage degree estimation, 44–45
 transient effects, evolution of, 45–47
 Cellular tissues, electrothermal treatments
 of, 83–84
 food engineering applications of MEF
 processes
 drying rate, 88–89
 extraction, 89–91
 fermentation, 91–92
 nonthermal effects of electric fields on cells
 with intact membranes, 84–88
 Cell wall in bacteria, yeast, and plants, 23–24
 Čemažar, M., 17, 21
 Chalermchatand, Y., 54
 Chand, P.K., 20
 Chang, D.C., 2, 52, 88
 Chao, R.Y., 62
 Chassy, B.M., 18
 Chauveteau, G., 164
 Cheftel, J.C., 39
 Chemical oxygen demand (COD), 206
 Chemomechanical system, 101
 Chen, C., 41
 Chen, G., 140
 Chen, H., 149
 Chen, X.D., 192
 Chen, Y.-S., 224
 Chen, Y.H., 97
 Chernomordik, L., 22
 Chiarelli, P., 101
 Chizmadzhev, Y.A., 41, 43

Chlorella vulgaris, see Algae

Cho, H.Y., 91

Chou, S.K., 70

Christou, P., 19

Chua, K.J., 70

Clark, P., 186, 189

Cold juice extraction, 196

Colin, F., 109

Collins, D.M., 18, 22

Combined field dewatering, 148

Conductivity disintegration index, 45

Consolidation coefficient, 125

Conte, P., 16

CoolPure[®], 185

Corrales, M., 62

Corynebacterium, 18

Cosgrove, D.J., 116

Coster, H.G.L., 22, 86

Cottrell, I.W., 102

Crank, J., 64, 71

Cserhalmi, Z., 186, 189

CSIRO, Australia, 145

Cui, Z.F., 169

Cui, W., 219

Cukjati, D., 15

D

Damage degree estimation, 44–45

Damage time, 45–46

Danfelter, M., 3–4, 6, 17

Danielli, J.F., 88

Darcy's law, 158, 176

Daskalov, I., 15

Davalos, R.V., 9

DC electrical field effects on plant tissues and gels, 96–97

advantages and future prospects of, 116–117

electrical apparatus and measurement systems, 97–99

electrification of gels, 99

alginate gels, 103–105

different gel types, 105–106

electrified networks, types of, 102–103

induction of phase transition in gels by electrical fields, 99–102

electrification of plant tissues, 107

electrification of fruit/vegetable pieces, 111–112

expression processes in the food industry and betanin extraction, 108–111

gel-plant "sandwiches," 114

gels and plant tissues, resemblance between, 108

influences of electrification on intact plant tissues, 114–116

inhibition of potato browning by electrical field, 112–113

mechanism involved in electrifying plant tissues, 116

Debye-Hueckel parameter, 169

Degree of electroporation, screening of, 252–255

Dejmek, P., 39, 44, 54, 201

Depolarizing factors, 43

Derjaguin-Landau-Verwey-Overbeek (DLVO) approach, 169

DeRossi, D., 101

Dev, D.K., 232

D'Halluin, K., 11, 20–21, 24

Dimitrov, D.S., 9, 22, 41

Diosady, L.L., 219, 230

Djuzenova, C.S., 10

DNA, 25

adsorption, 10

damage, 4

–membrane interaction, 11

plasmid, 6

topology on transformation efficiency, 18

Doenenburg, H., 202

Doevenspeck, H., 183–184, 193, 255

Doi, M., 101

Donaldson, A.L., 243–244

Dougherty, W., 9

Dower, W.J., 18–19, 24

Drainage surface, 123

Drying

food plants, 70–75

kinetics and moisture diffusion affected by PEF cell disintegration, 70–74

temperature evolution, 74–75

processes, 72

rate, 88–89

Duckworth, M., 105

E

Edd, J.F., 9

Edebo, L., 183

El-Belghiti, K., 62–63, 65–66, 196, 219, 228–229

Elcrack[®], 185

Electric field

and electroporation, 4–9

strength and total treatment time, 51–52

Electric pulses, 4

- Electrification
of fruit/vegetable pieces, 111–112
of plant tissues
 gel-plant "sandwiches," 114
 gels and plant tissues, resemblance
 between, 108
 influences of, on intact plant tissues,
 114–116
 inhibition of potato browning by
 electrical field, 112–113
 mechanism involved in electrifying
 plant tissues, 116
- Electrochemotherapy, 16–17
- Electrofiltration of biomaterials, 156
dewatering of, 156
 filtration, 158–162
 force balance, 157–158
 press electrofiltration *versus* cross-flow
 filtration, 162–167
 press electrofiltration *versus* thermal
 evaporation, 162–167
- fractionation, 168–169
of bacteria and extracellular enzyme
 product, 169–171
with electrofiltration, 175–176
of highly viscous polysaccharide and
 protein, 171–172
of proteins, 172–175
 guidelines, 176–177
- Electrofusion, 8–10
- Electrohydraulic treatment, 183
- Electrokinetic remediation, 151
- Electro-osmotic dewatering (EOD), 121–122,
145
characteristics of materials suitable for,
 127–128
electric field for high-performance,
 128–131
 combination of constant current
 and constant voltage conditions,
 138–139
 electrode arrangements and
 configurations, 139–144
 with electrode polarity reversals,
 128–131
 interrupted or intermittent electric field
 application, 132–138
- food processing products and wastes,
 148–151
- principles for high performance, 126–127
- sewage/activated sludge and biomass
 sludge, 145–148
- theoretical developments, 122–126
- Electroosmotic pressure gradient, 125
- Electropermeabilization, 40–44, 84–85, 87
 membranes and cells, stability of, 43–44
 transmembrane potential, 41–43
- Electroporation, 87, 193
applications
 bacteria and yeast, 18–19
 medicine, use in, 16–17
 plant protoplast electroporation, 19–20
 transfection of intact plant tissue, 20–21
 water sterilization and food
 preservation, 17–18
- basics and mechanisms, 2–4
on cell cytoskeleton, 23
degree of, screening of, 252–255
of different cell types, 21–22
electrodes/shaping the electric field, 15–16
 cell cytoskeleton, influence of, 23
 cell membrane fluidity, influence of, 22
 cell wall in bacteria, yeast, and plants,
 influence of, 23–24
- influential parameters, 4
 electric field, 4–9
 medium composition, 9–10
 osmotic pressure, 10–12
 single-cell to tissue, 12–15
- Electropure process, 183, 190
- Electrothermal treatments of cellular tissues,
83–84
 food engineering applications of MEF
 processes
 drying rate, 88–89
 extraction, 89–91
 fermentation, 91–92
 nonthermal effects of electric fields on cells
 with intact membranes, 84–88
- Elsteril[®] process, 184
- El Zakhem, H., 45
- Enzymatic browning, 112
- Enzyme inactivation, 187
- EOD, *see* Electro-osmotic dewatering (EOD)
- Escande-Geraud, M.L., 12
- Escherichia coli*, 18
- Eshtiaghi, M.N., 54, 111, 196, 198, 255, 261
- Eskin, N.A.M., 112
- Evans, G.A., 6
- Evrendilek, G.A., 52, 186, 189–190
- Exerova, D., 49
- Extraction, 89–91
- Eynard, N., 11, 19–20, 24
- F**
- Faurie, C., 4, 7
- Fear, E.C., 15

- Fedorenchenko, L.A., 89
 Fellows, P.J., 109
 Feng, T.Y., 11, 20, 22–24
 Fensom, D.S., 86
 Ferber, D., 2
 Fermentation, 91–92
 FET, *see* Field effect transistor (FET)
 Fetterman, J.C., 183
 Fiedler, S., 18
 Field effect transistor (FET), 140
 Filev, P.D., 40
 Filtration acceleration, 170
 Fincan, M., 39, 44, 62, 193, 198–199, 201
 Flaumenbaum, B.L., 40, 193–194, 255
 Food engineering applications of MEF processes
 drying rate, 88–89
 extraction, 89–91
 fermentation, 91–92
 Food industry and betanin extraction, 108–111
 Food industry applications for pulsed electric fields, 181–182
 energy requirements and cost-effectiveness, 207–209
 future aspects, 209–210
 historical approach, 183–186
 mass transfer process in plant material
 drying enhancement, 199–200
 PEF-assisted cell expression and extraction, 193–199
 meat treatment, 203–205
 preservation of foods, 186–189
 juice, 189–190
 milk, 190–192
 softening of plant tissue, 200–201
 stress, 201–203
 wastewater treatment, 206
 Food plants
 drying of, 70–75
 solid-liquid expression from, 54–61
 Food preservation, water sterilization and, 17–18
 Frenzel, S., 259
 Fricke, H., 43
 Fromm, M.E., 2, 19
 Fryer, P.J., 85
 Fusogenic state, cell membrane, 3
- G**
 Gabriel, B., 3–5, 13, 20
 Galatas, F., 105
 Gallo, S.A., 22
 Galvani's observation, 96
 Ganeva, V., 11, 19–20, 24
 “Gate” electrode, 140
 Gates, J.C., 107
 Gehl, J., 17
 Gel-plant “sandwiches,” 114
 Gels and plant tissues, resemblance between, 108
 Gene electrotransfer, 11, 19–20
 Generator configurations, 238–242
 Getchell, B.E., 183
 Ghosh, R., 156, 169
Giardia muris, 18
 Gilliland, S.E., 183
 Gimsa, J., 43
 Glicksman, M., 103
 Golzio, M., 4, 7–8, 11
 Gong, J.P., 101
 Gopalakrishnan, S., 133–134
 Gorbatov, A.V., 40, 45
 Gould, S.W., 18
 Gozukirmizi, N., 21
 Gradzinsky, A.J., 101
 Graham, L.L., 23
 Graškova, D., 13, 17
 Gray, D.H., 131
 Green chemistry, 62
 Greenham, C.G., 252
 Grimi, N., 59–60
 Grinding energy, 201
 Grobner, U., 10, 22
 Gros, C., 218, 222–223, 225–228, 230–233
 Gross, D., 13
 Grosse, C., 13
 Guderjan, M., 197–198, 202, 208
 Gudmundsson, M., 203
 Gulyi, I.S., 40
 Gupte, A.R., 157
 Gurel, F., 21
- H**
 Haas, C.N., 18
 Hafsteinsson, H., 203, 205
 Halden, K., 90
 Hamilton, W., 3–4, 6, 13, 51, 184
 Hamlen, R.R., 100, 102
 Hansen, H.K., 148
 Harkin, D.G., 23
 Harris, R.V., 220
 Hart, G.H., 132
 Hashinaga, F., 70
 Haufe, W., 244
 Hay, E.D., 23
 He, G.Y., 21

- Heinz, V., 183, 186, 190, 203, 209
Heller, R., 6, 17
Henry, B.S., 109
Hibino, M., 3, 13
High-voltage electrical discharges (HVED),
217–221
 condition of apparition, 221–222
 material and energy, 222–224
 steps of creation, 221
 for various applications, 224–225
Hiraoka, M., 145
Hirose, Y., 101, 104, 107
Hirotzu, S., 101
Hnatiuc, E., 218
Ho, M.Y., 140
Ho, J.S., 41
Hodgins, A.M., 186
Hofmann, R., 155, 159–160, 164, 174
Hui, S.W., 2, 12
Hybrid processes, 168
Hydrocolloid gels, 100
- I**
Imai, T., 85
Iritani, E., 156
Irreversible electroporation, 9, 17–18
 See also Electroporation; Reversible
 electroporation
Isobe, S., 18, 150
Iwata, M., 122–123, 125, 129
- J**
Jaeger, H., 181, 191–192
Janáček, K., 85, 88
Janmey, P., 23
Janositz, A., 201
Jaroszeski, M.J., 9
Jayaram, S., 189
Jemai, A., 44, 54, 57, 62, 89–90, 196, 207, 255
Jeyamkondan, S., 183
Joersbo, M., 19–20, 86, 88
Jones, M.G.K., 88
Jørgensen, K., 49
Joshi, A.A., 221
Juice, 189–190
Juice decontamination, 190
Jumah, R., 150
- K**
Kafaar, A., 148
Kandušer, M., 1, 21–22
Kanthou, C., 17, 23
Käppler, T., 155, 159, 170, 173–174
Karlsruher elektroporations anlage (KEA), 256
Katrokha, I.M., 40
Katsuki, S., 219
Kaufmann, M., 156
KEA, *see* Karlsruher elektroporations anlage
 (KEA)
KEA-ZAR, 259
Kemp, M.R., 85
Kim, J., 89
Kim, S.H., 220
Kim, Y.H., 19, 24
Kind, D., 250
Kinosita, K., 3, 13, 22, 88
Kiselev, V.Ya., 243
Kishi, R., 101, 103, 107
Klenchin, V.A., 4, 6
Kliewe, V.H., 91
Knorr, D., 47, 54, 73, 97, 111, 181, 193, 196,
198, 200, 202, 255, 261
Koehler, E., 199
Kogan, F.I., 40
Kohlrabi (*Brassica oleracea*), 112
Kondoh, S., 145
Koners, U., 206
Kopplow, O., 206
Kotnik, T., 2, 4, 13, 41, 43, 53
Kotyk, A., 85, 88
Krassowska, W., 40
Kraus, W., 186, 201
Krupp Maschinentechnik, 184–185
Kulshrestha, S., 83, 85, 90
Kupchik, M.P., 40
Kurauchi, T., 101
Kutney, J.P., 20
- L**
Lactobacillus acidophilus, 91–92
Lactococcus lactis, 92
 β -Lactoglobulin, 191
Ladygin, V.G., 20
Lakkakula, N.R., 90
Landau, L.D., 43
Lazzeri, P.A., 21
LBG, *see* Locust bean gum (LBG)
Leader, 221
Lebedeva, N.E., 43–44
Lebovka, N.I., 9, 17–18, 39–41, 43–49, 51–52,
54, 56, 63–65, 70–74, 83, 89, 194,
201, 253
Lechner, N., 186, 189
Lecourtier, J., 164
Lee, C.Y., 112
Lee, R.C., 9
Lee, T.M.O., 19

- Leontiadou, H., 3
 Lewis, F.C., 183
 Li, F.-D., 70
 Li, L.H., 9, 16, 150
 Li, S.-Q., 189, 191
 Li, X., 150
 Lightfoot, D.G., 148–149
 Lima, M., 40, 70, 85, 89–90
 Lindsey, K., 88
 Liu, F., 10
 Liu, M., 7
 Lockhart, N.C., 128, 132, 139
 Locust bean gum (LBG), 100
 Loeffler, M., 206
 Loew, L.M., 13
 Loghavi, L., 83, 91–92
 Lopes Barbosa, A.C., 219
 Lorz, H., 20
 Lu, X.-P., 218
 Lucas, M.L., 6
 Lund, E.J., 97
 Lundqvist, J.A., 15
 Lysjanskii, 64
 Lysozyme, 174
- M**
- Macromolecules, 6–8, 19
 Mašek-Lebar, A., 4–5
 Maize germ oil, 197
 Malik, M.A., 224
 Mañas, P., 52
 Marchal, L., 56
 Marszalek, P., 2, 13
 Martin, J.C., 222
 Martín-Belloso, O., 52
 Marx, E., 239–240
 Marx capacitors, 246
 Marx generators, 241, 246–250, 259
 Mason, C.K., 19
 Mastwijk, H., 187
 Matov, B.I., 40
 May, B.K., 71–72
 Mazan, M., 23
 Mazza, G., 219
 McDonald, C.J., 186
 McLellan, M.R., 194
 Meaking, W.S., 3–4, 6
 Meat treatment
 food industry applications for pulsed
 electric fields, 203–205
 Medicine and electroporation, 16–17
 Meer, W., 105
 Mehta, A., 169
- Meilhoc, E., 19
 Membrane fluidity, 22
 Membranes and cells, stability of, 43–44
 Messner, P., 23
 Microfiltration membranes, 176
 Miklavcic, D., 1, 4–5, 13, 15–17,
 22, 43
 Mikula, M., 224–225
 Mild electric field (MEF) application, 207
 Milk, 190–192
 Miller, L., 9
 Min, S., 186, 189
 Mir, L.M., 7, 17
 Mitchell, C.A., 201
 Mittal, G.S., 41
 Moderate electric field (MEF)-treatment, 40
 Molinari, P., 186
 Mordhorst, A.P., 20
 Morren, J., 187
 Moses, B.D., 183
 Mouritsen, O.G., 49
 Münch, E.W., 203
- N**
- Naugol'nykh, K.A., 218–219
 Neidhardt, F.C., 85–86
 Neidl, G., 91
 Neumann, E., 2–4, 6, 10, 19
 Nicotinamide adenine dinucleotide
 (NAD), 86
 Nikolova, A., 49
 Nobel, P.S., 110
 Nonthermal food preservation
 benefit of, 18
 Novaković, S., 21
 Nussinovitch, A., 95, 97, 100–102, 104–109,
 111–114
- O**
- Oblak, J., 18
 Ochatt, S.J., 20
 O'Hare, M.J., 21
 Ohno-Shosaku, T., 10
 Ohta, Y., 220
 Oilseeds, aqueous extraction from, 217–220
 extraction enhanced by HVED, 225–226
 extraction of soluble molecules,
 226–230
 oil extraction, 230–233
 quality of extracted products, 226
 high-voltage electrical discharges, 220–221
 condition of apparition, 221–222
 material and energy, 222–224

- Oilseeds, aqueous extraction from (*cont.*)
 steps of creation, 221
 for various applications, 224–225
 stages, 220
- Okada, M., 142
- Okada, Y., J., 10
- Okara, 150
- Olofsson, J., 15
- Optimal energy consumption, 47–48
- Orrenius, S., 10
- Orsat, V., 148–149
- Ortega-Rivas, E., 189
- Osada, Y., 101, 107
- Osmotic dehydration (OD), 68–70
- Osmotic pressure, 10–12
- Osterhout, W.J.V., 86
- P**
- Paradossi, G., 164
- Pauly, H., 41, 43
- Pavlin, M., 3, 5, 10, 14, 44
- Pavšelj, N., 7, 15–16
- Peleg, M., 104, 108
- Perez, O., 191
- Perré, P., 71–72
- Phytochemical defense, 201
- Phytosterol, 202
- Picart, L., 190
- Pilosof, A.M.R., 191
- Pitt, R.E., 19, 22
- Plant oils, 197
- Plant protoplast electroporation, 19–20
- Plant tissues, pulsed-electric-fields-induced
 effects, 39–40
 diffusion, and drying
 aqueous extraction of solutes from food
 plants, 62–68
 drying of food plants, 70–75
 osmotic dehydration, 68–70
 solid–liquid expression from food
 plants, 54–61
 electric field effects in, 40
 damage as function of pulse protocol,
 51–53
 electrically induced damage, 44–47
 electroporabilization, 40–44
 electroporation during ohmic heating,
 50–51
 optimal energy consumption, 47–48
 synergetics of, and thermal treatments,
 48–49
- Plant tissues and gels, DC electrical field
 effects on, 96–97
- advantages and future prospects of,
 116–117
- electrical apparatus and measurement
 systems, 97–99
- electrification of gels, 99
 alginate gels, 103–105
 different gel types, 105–106
 electrified networks, types of, 102–103
 induction of phase transition in gels by
 electrical fields, 99–102
- electrification of plant tissues, 107
 electrification of fruit/vegetable pieces,
 111–112
 expression processes in the food
 industry and betanin extraction,
 108–111
 gel-plant "sandwiches," 114
 gels and plant tissues, resemblance
 between, 108
 influences of electrification on intact
 plant tissues, 114–116
 inhibition of potato browning by
 electrical field, 112–113
 mechanism involved in electrifying
 plant tissues, 116
- Plasmolysis, *see* Electroporabilization
- Pliquett, U., 5, 10, 41
- PMF, *see* Proton motive force (PMF)
- Pollack, G.H., 99
- Polyelectrolyte gels, 102
- Polymer filter cakes, 159
- Polyphenol oxidase, 113
- Polysaccharides, 102, 108
- Polyvinyl alcohol (PVA) gel fiber, 100
- Posten, C., 155, 159–160, 173–174
- Praporscic, I., 40, 54–58, 89, 196
- Prausnitz, M.R., 3
- Preat, V., 7
- Press electrofiltration, 155, 157, 159, 176
versus cross-flow filtration, 162–167
- Pressing–washing–pressing (PEF– P–W–P),
 59–60
- Probstein, R.F., 151
- Prochownick, L., 183
- Proton motive force (PMF), 85–86
- Pseudomonas fluorescens*, 191
- Puc, M., 3, 16
- Pucihar, G., 5, 10, 13–15, 44
- Pulsed-electric-fields-induced effects in plant
 tissues, 39–40
 diffusion, and drying
 aqueous extraction of solutes from food
 plants, 62–68

- drying of food plants, 70–75
 - osmotic dehydration, 68–70
 - solid–liquid expression from food plants, 54–61
 - electric field effects in, 40
 - damage as function of pulse protocol, 51–53
 - electrically induced damage, 44–47
 - electropermeabilization, 40–44
 - electroporation during ohmic heating, 50–51
 - optimal energy consumption, 47–48
 - synergetics of, and thermal treatments, 48–49
 - Pulsed electric fields (PEF), biological tissues, 237–238
 - emerging industrial applications
 - green biomass by electroporation assisted dewatering, 264–268
 - treatment of grapes, 260–264
 - treatment of sugar beets, 255–260
 - pulse generators for industrial applications
 - burn-up control scheme, 249–252
 - generator configurations, 238–242
 - screening of the degree of electroporation, 252–255
 - synchronization, 246–249
 - with pulse generators for industrial applications
 - spark gap switches, 242–246
 - Pulsed electric fields (PEF), food industry
 - applications for, 181–182
 - energy requirements and cost-effectiveness, 207–209
 - future aspects, 209–210
 - historical approach, 183–186
 - improvement of mass transfer process in plant material
 - drying enhancement, 199–200
 - PEF-assisted cell expression and extraction, 193–199
 - meat treatment, 203–205
 - preservation of foods, 186–189
 - juice, 189–190
 - milk, 190–192
 - softening of plant tissue, 200–201
 - stress, 201–203
 - wastewater treatment, 206
 - Pulse generators for industrial applications
 - burn-up control scheme, 249–252
 - generator configurations, 238–242
 - screening of the degree of electroporation, 252–255
 - spark gap switches, 242–246
 - synchronization, 246–249
 - Pulse modulator typology, 208
 - Pulse protocol, damage as function of, 51–53
 - electric field strength and total treatment time, 51–52
 - intervals between pulses, 52
 - pulse duration, 52–53
 - waveforms, 52
 - Punch-through, 87
 - Pyun, Y., 89
- Q**
- Qin, B.L., 52
 - Quecini, Y.M., 20
 - Quensel, E., 232
- R**
- Rabie, H.R., 133
 - Radish (*Raphanus sativus*), 112
 - Raghavan, G.S.V., 148–149
 - Rakoczy-Trojanowska, M., 21
 - Ramanathan, S., 107
 - Ramos, C., 2, 8–9
 - Rampacek, C., 122
 - Raouzeos, G.S., 71
 - Raphanus sativus*, see Radish
 - Raso, J., 52–53
 - Rassis, D., 104
 - Rastogi, N.K., 97, 200
 - Raw juice purity, 258
 - Reactive oxidative species, 20–21
 - Reberšek, M., 4, 7
 - Rech, E.L., 20
 - Reddy, K.R., 151
 - Reina, L.D., 190
 - Relative moisture content, 200
 - Reshetko, E.V., 40
 - Reversible electroporation, 16
 - Rogov, I.A., 40, 45
 - Roi, N.A., 218–219
 - Rols, M.P., 2–5, 8, 10–11, 13, 16, 21–23
 - Roodenburg, B., 187
 - Rosenheck, K., 3
 - Rosenthal, A., 219
 - Rouan, D., 21
 - Rowley, B.A., 91
 - Rubinsky, B., 9
 - Rumpf, H., 157
 - Ryttsen, F., 13, 15
- S**
- Sabri, N., 11, 20, 24
 - Saccharomyces cerevisiae*, 23

- Sack, M., 237, 245–246, 254, 266
 Saguy, I., 75
 Sale, A.J.H., 3–4, 6, 13, 51, 184
 Salengke, S., 70, 89
 Sampedro, F., 52–53, 190
 Saponification values, 198
 Saravacos, G.D., 71
 Sastry, S.K., 40, 51, 56, 70, 83, 85, 88–90, 97,
 110–111, 207
 Šatkauskas, S., 4, 7–8
 Saunders, J.A., 8, 10, 19–20, 24
 Saveyn, H., 148
 Scanning electron microscopy (SEM)
 microscopy, 205
 Schaffer, C., 23
 Scheffer, K., 264
 Schilling, S., 194–195
 Schreier, P.J.R., 85, 90
 Schultheiss, C., 186, 255
 Schuten, H., 187
 Schwan, H.P., 2, 13, 41, 43
 Schwan's equation, 2
 Schwartzberg, H.G., 54, 62
 Schwuger, M.J., 157
 Screening of the degree of electroporation,
 252–255
 Seifriz, W., 96–97
 Šel, D., 15–16
 Selectrochemotherapy, 16–17
 Selin, I., 183
 Semisolid, 99
 Šemrov, D., 15
 Sensoy, I., 90, 110, 207
 Sepulveda, D.D., 186, 190
 Serša, G., 4, 17
 Shahidi, F., 219
 Shaplo, A.P., 151
 Sharma, A., 220
 Shiga, T., 101
 Shimada, K., 91
 Shimahara, K., 91
 Shinohara, H., 104
 Shirato, M., 125
 Shoenfeld, N.A., 101
 Shynkaryk, M.V., 40, 47, 70, 73–75
 Sigler, J., 261–263
 Silberberg, A., 108
 Single-cell electroporation, 12
 See also Electroporation
 Single-cell to tissue, 12–15
 Sitzmann, W., 203
 Sludge, 206
 Small molecules, 5–6
 Smelt, J.P.P.M., 52
 Smith, K., 190
 Smollen, M., 148
 Soike, K., 183
 Solid–liquid expression from food plants,
 54–61
 combined pressing and PEF-treatment, 54
 kinetics of solid–liquid expression and
 quality of juices, 54–61
 Solid–liquid separation of biomaterials, 156
 Somiari, S., 7
 Somogyi, F., 131
 Sorokin, A.P., 21
 Southwell, K.H., 220
 Sowers, A.E., 8–9, 22, 41
 Spaeth, F., 183
 Spark gap switches, 242–246
 Speck, M.L., 183
Spirulina platensis, 199
 Stanley, D.W., 110, 189
Staphylococcus aureus, 183
 Stein, W.D., 88
 Stenger, D.A., 2, 12
 Stopper, H., 16
 Stuchly, M.A., 15
 Suga, M., 19
 Sugar production, 196
 Sugiarto, A.T., 220–221, 224
 Sukharev, S.I., 4, 6
 Sun, B., 217–218, 221, 224
 Susil, R., 14
 Suzuki, Y., 148
 SYMBIOSE 164, 166
 Synchronization, 246–249
 Szczesniak, A., 108
- T**
 Taiwo, K.A., 111
 Takac, S., 170
 Tal, Y., 104
 Tanaka, T., 100–101, 116
 Tanaka's explanation, 101
 Tano-Debrah, K., 220
 Tarek, M., 40
 Tedjo, W., 196, 198–199, 261
 Teijo, W., 69
 Teissié, J., 2–5, 8–11, 13, 16, 18, 20–21, 23, 40
 Tekle, 4, 7, 13
 Temelli, F., 219
 Tetramethylethylenediamine (TEMED), 100
 Thiele, H., 183
 Three-dimensional polymeric network, 108
 Timberlake, C.F., 109

- Tissue shrinkage, 113
 Tissue softening, 201
 Toepfl, S., 39, 43–44, 51, 54, 57, 70, 73,
 183–184, 186, 189–190, 194–195,
 200, 203, 205–207, 209
 Tofu, 150
 Tolstoguzov, V.B., 108
 Total soluble solids (TSS), 206
 Tracy, R.L., 183
 Transfection of intact plant tissue, 20–21
 Transmembrane potential, 41–43
 Trevors, J.T., 24, 99
 Tryfona, T., 18
 Tsong, T.Y., 2–3, 13, 18, 22, 86, 88
 Tsukamoto, S., 237
 Tubulin, 23
- U**
 Uemura, K., 18
 Ueoka, Y., 101
 Ulmer, H.M., 186
 Unal, R., 92
 Županič, A., 17
- V**
 Valič, B., 8, 13, 43
 Vamos-Vigyazo, L., 113
 Van der Poel, P.W., 54, 62–63
 Van der Rest, M.E., 19, 22
 Vaneijndhoven, R.H.C.M., 169
 Vanisree, M., 20
 Van Loey, A., 187
 Vega-Mercado, H., 39, 70
 Velizarov, S., 10, 22
 Vernhes, M.C., 4–5
 Vienken, J., 8, 10
 Vijh, A.K., 130, 140, 151
 Vishkvatzev, L.I., 220, 226
Vitis vinifera, see Wine grapes
 Vitkovitsky, I., 221, 224
 Vorobiev, E., 17–18, 39, 43–45, 54–58, 62–63,
 83, 89–90, 193–194, 196, 207, 255
- W**
 Wachner, D., 43
 Wahab, S.M.A., 101
 Wakeman, R.J., 128, 156
 Walden, R., 21
 Walker, J.R.L., 113
 Wanasundara, P.K.J.P.D., 219
 Wang, W.C., 40, 51, 56, 88, 97, 111
 Wang, X., 18
 Wards, B.J., 18, 22
 Washing–pressing (PEF–W–P), 59–60
 Water/press-cake ratio, 232
- Water sterilization and food preservation,
 17–18
 Weaver, J.C., 2, 9, 13, 41, 43, 88
 Wesley, R.H., 225
 Whitaker, J.R., 112
 Whiting, C.J., 102
 Williams, E.J., 85
 Willis, R.H., 107
 Wine grapes, 203
 Wingender, R., 21
 Wirth, R., 18
 Wolf, H., 4, 6–7, 11
 Wolf, K., 183
 Wouters, P.C., 52–53
 Wu, F.S., 11, 20, 22–24
 Wu, Y., 8
- X**
 Xanthan, 100, 164, 171
 Xia, B., 150
 Xie, T.D., 10, 18, 37
 Xue, G.P., 11
- Y**
 Yamada, K., 140
 Yamaguchi, M., 145
 Yang, R.J., 113, 187
 Yang, R.Y.K., 20
 Yaphe, W., 105
 Ye, H., 111
 Yeom, H.W., 189
 Yin, Y.G., 111
 Yoon, S.W., 90
 Yoshida, H., 121, 128–132, 135, 138–140, 142
 Yoshioka, Y., 107
 Yukawa, H., 121, 145, 159, 161
 Yukawa's enhancement of Darcy's law, 159
 Yushkov, A., 222–223
- Z**
 Zagorulko, A.Ja., 40
 Zaharoff, D.A., 6–7
 Zampaglione, I, 7
 Zárate-Rodríguez, E., 189
 Zhang, Q., 9, 18
 Zhang, Q.H., 52, 86, 186, 189, 191, 997
 Zhang, Z., 71
 Zhong, T., 40, 70, 89
 Zhou, A., 18
 Zhou, J., 143
 Zimmermann, U., 2–3, 8, 10, 13, 22, 43,
 49, 88
 Zuckerman, H., 218, 220–221, 224
 Zvitov, R., 96–97, 100–102, 104–115
 Zwieniecki, M., 114, 116
 Zydny, A.L., 169