

Contents

Preface	v
Contributors	xi
1 Immobilization of Enzymes as the 21st Century Begins: <i>An Already Solved Problem or Still an Exciting Challenge?</i> Jose M. Guisan	1
2 Immobilization of Enzymes: A Literature Survey Beatriz M. Brena and Francisco Batista-Viera	15
3 Cross-Linked Enzyme Aggregates Roger A. Sheldon, Rob Schoevaart, and Luuk M. van Langen	31
4 Immobilization-Stabilization of Enzymes by Multipoint Covalent Attachment on Supports Activated With Epoxy Groups Cesar Mateo, Olga Abian, Gloria Fernández-Lorente, Benevides C. C. Pessela, Valeria Grazu, Jose M. Guisan, and Roberto Fernandez-Lafuente	47
5 Glutaraldehyde in Protein Immobilization: A Versatile Reagent Lorena Betancor, Fernando López-Gallego, Noelia Alonso-Morales, Gisella Dellamora, Cesar Mateo, Roberto Fernandez-Lafuente, and Jose M. Guisan	57
6 Practical Protocols for Lipase Immobilization Via Sol-Gel Techniques Manfred T. Reetz	65
7 Encapsulation of Enzymes Using Polymers and Sol-Gel Techniques Mònica Campàs and Jean-Louis Marty	77
8 Design of Smart Biocatalysts: <i>Immobilization of Enzymes on Smart Polymers</i> Ipsita Roy and Munishwar N. Gupta	87
9 Affinity Immobilization of Tagged Enzymes Silvana Andreescu, Bogdan Bucur, and Jean-Louis Marty	97
10 Bioaffinity Immobilization Ipsita Roy and Munishwar N. Gupta	107
11 One-Step Purification, Immobilization, and Stabilization of Poly-Histidine-Tagged Enzymes Using Metal Chelate-Epoxy Supports Cesar Mateo, Benevides C. C. Pessela, Valeria Grazu, Rodrigo Torres, Fernando López-Gallego, Jose M. Guisan, and Roberto Fernandez-Lafuente	117

- 12 Stabilization of Multimeric Enzymes Via Immobilization
and Further Cross-Linking With Aldehyde-Dextran
*Cesar Mateo, Benevides C. C. Pessela, Manuel Fuentes,
Rodrigo Torres, Lorena Betancor, Aurelio Hidalgo,
Gloria Fernández-Lorente, Roberto Fernandez-Lafuente,
and Jose M. Guisan* 129
- 13 Purification, Immobilization, Hyperactivation, and Stabilization
of Lipases by Selective Adsorption on Hydrophobic Supports
*Jose M. Palomo, Gloria Fernández-Lorente, Cesar Mateo,
Rosa L. Segura, Claudia Ortiz, Roberto Fernandez-Lafuente,
and Jose M. Guisan* 143
- 14 Immobilization and Stabilization of Proteins by Multipoint Covalent
Attachment on Novel Amino-Epoxy-Sepabeads®
*Cesar Mateo, Benevides C. C. Pessela, Valeria Grazu,
Fernando López-Gallego, Rodrigo Torres, Manuel Fuentes,
Aurelio Hidalgo, Jose M. Palomo, Lorena Betancor,
Gloria Fernández-Lorente, Claudia Ortiz, Olga Abian,
Jose M. Guisan, and Roberto Fernandez-Lafuente* 153
- 15 Improved Stabilization of Chemically Aminated Enzymes Via
Multipoint Covalent Attachment on Glyoxyl Supports
*Tamara Montes, Fernando López-Gallego, Manuel Fuentes,
Cesar Mateo, Valeria Grazu, Lorena Betancor, Jose M. Guisan,
and Roberto Fernandez-Lafuente* 163
- 16 Stabilization of New Imprint Property of Glucose Oxidase in Pure
Aqueous Medium by Cross-Linked-Imprinting Approach
Alankar Vaidya and Lutz Fischer 175
- 17 Reversible Covalent Immobilization of Enzymes
Via Their Thiol Groups
Francisco Batista-Viera, Karen Ovsejevi, and Carmen Manta 185
- 18 Very Strong But Reversible Immobilization of Enzymes on Supports
Coated With Ionic Polymers
*Cesar Mateo, Benevides C. C. Pessela, Manuel Fuentes, Rodrigo Torres,
Claudia Ortiz, Fernando López-Gallego, Lorena Betancor,
Noelia Alonso-Morales, Jose M. Guisan,
and Roberto Fernandez-Lafuente* 205
- 19 Immobilization of Enzymes on Magnetic Particles
*Martina Koneracká, Peter Kopčanský, Milan Timko,
Chenyl Nynitapal Ramchand, Zainul M. Saiyed, Michael Trevan,
and Anil de Sequeira* 217
- 20 Immobilization of Proteins on Gold Surfaces
José M. Abad, Marcos Pita, and Víctor M. Fernández 229
- 21 Immobilization of Enzymes on Electrodes
Gilvanda Silva Nunes and Jean-Louis Marty 239

22	Immobilization of Enzymes for Use in Organic Media <i>Patrick Adlercreutz</i>	251
23	Immobilization of Enzymes for Use in Ionic Liquids <i>Pedro Lozano, Teresa de Diego, and José L. Iborra</i>	257
24	Immobilization of Enzymes for Use in Supercritical Fluids <i>Pedro Lozano, Teresa de Diego, and José L. Iborra</i>	269
25	Immobilized Enzymes for Biomedical Applications <i>Amaia Esquisabel, Rosa María Hernández, Alicia Rodríguez Gascón, and José Luis Pedraz</i>	283
26	Characterization of Immobilized Enzymes by Microcalorimetry <i>Ezio Battistel and Giovanni Rialdi</i>	295
27	Use of Immobilized Biocatalysts in Fluidized Bed Format <i>Ipsita Roy and Munishwar N. Gupta</i>	311
28	Taylor–Couette Vortex Flow in Enzymatic Reactors <i>Roberto Campos Giordano and Raquel de Lima Camargo Giordano</i>	321
29	A Novel Immobilization Method for Entrapment: <i>LentiKats</i> ® <i>Marc Schlieker and Klaus-Dieter Vorlop</i>	333
30	Encapsulation of Cells in Alginate Gels <i>Gorka Orive, Rosa María Hernández, Alicia Rodríguez Gascón, and José Luis Pedraz</i>	345
31	Immobilization of Cells on Polyurethane Foam <i>Ignacio de Ory, Gema Cabrera, Martín Ramirez, and Ana Blandino</i>	357
32	Immobilization of Cells With Transition Metal <i>Pedro Fernandes</i>	367
33	Immobilization of Microalgae <i>Nirupama Mallick</i>	373
34	Bioluminescence in Immobilized Cells for Biomass Detection and Biosensor Applications <i>Marián Navrátil, Juraj Švitel, Peter Gemeiner</i>	393
35	A Proteomic Approach to Biofilm Cell Physiology <i>Laurent Coquet, Sébastien Vilain, Pascal Cosette, Thierry Jouenne, and Guy-Alain Junter</i>	403
36	Encapsulation of Bacteria for Biodegradation of Gasoline Hydrocarbons <i>Peyman Moslemy, Serge R. Guiot, and Ronald J. Neufeld</i>	415
37	Biomedical Applications of Immobilized Cells <i>Gorka Orive, Rosa María Hernández, Alicia Rodríguez Gascón, and José Luis Pedraz</i>	427
	Index	439