Biocatalysis for Green Chemistry and Chemical Process Development



Edited by Junhua (Alex) Tao Romas Kazlauskas



CONTENTS

CONTRIBUTORS PREFACE	vii xi
PART I INTRODUCTION CHAPTERS	1
1 BIOTECHNOLOGY TOOLS FOR GREEN SYNTHESIS: ENZYMES, METABOLIC PATHWAYS, AND THEIR IMPROVEMENT BY ENGINEERING	3
2 HOW GREEN CAN THE INDUSTRY BECOME WITH BIOTECHNOLOGY?	23
3 EMERGING ENZYMES AND THEIR SYNTHETIC APPLICATIONS	45
4 REACTION EFFICIENCIES AND GREEN CHEMISTRY METRICS OF BIOTRANSFORMATIONS	67
PART II APPLICATION AND CASE STUDIES— PHARMACEUTICALS AND FINE CHEMICALS	89
5 BIOCATALYTIC ROUTES TO CHIRAL INTERMEDIATES FOR DEVELOPMENT OF DRUGS	91

6	TRANSGLUTAMINASE FOR PROTEIN DRUG MODIFICATION: PEGYLATION AND BEYOND	151
7	MICROBIAL PRODUCTION OF PLANT-DERIVED PHARMACEUTICAL NATURAL PRODUCTS THROUGH METABOLIC ENGINEERING: ARTEMISININ AND BEYOND	173
8	TOWARD GREENER THERAPEUTIC PROTEINS	197
PAI	RT III APPLICATION AND CASE STUDIES— FLAVOR & FRAGRANCE, AGROCHEMICALS AND FINE CHEMICALS	221
9	OPPORTUNITIES FOR BIOCATALYSIS IN THE FLAVOR, FRAGRANCE, AND COSMETIC INDUSTRY	223
10	APPLICATION OF BIOCATALYSIS IN THE AGROCHEMICAL INDUSTRY	255
11	GREEN PRODUCTION OF FINE CHEMICALS BY ISOLATED ENZYMES	277
12	WHOLE CELL PRODUCTION OF FINE CHEMICALS AND INTERMEDIATES	299
PA	RT IV APPLICATION AND CASE STUDIES— POLYMERS AND RENEWABLE CHEMICALS	327
13	GREEN CHEMISTRY FOR THE PRODUCTION OF BIODEGRADABLE, BIORENEWABLE, BIOCOMPATIBLE, AND POLYMERS	329
14	ENZYMATIC DEGRADATION OF LIGNOCELLULOSIC BIOMASS	361
15	BIOCONVERSION OF RENEWABLES—PLANT OILS	391
16	MICROBIAL BIOPROCESSES FOR INDUSTRIAL-SCALE CHEMICAL PRODUCTION	429
IND	DEX	469