## Contents

1 Introduction .................................................. 1  
   Stephen Van Dien

2 Gene Expression Engineering ............................. 7  
   Nicholas J. Morse and Hal S. Alper

3 Heterologous Pathway Engineering ....................... 31  
   Wei Niu, Jiantao Guo and Steve Van Dien

4 Leveraging Gene Synthesis, Advanced Cloning Techniques,  
   and Machine Learning for Metabolic Pathway Engineering .... 53  
   Kedar G. Patel, Mark Welch and Claes Gustafsson

5 Tolerance of Microbial Biocatalysts to Feedstocks, Products,  
   and Environmental Conditions ............................ 73  
   Mian Huang, George Peabody and Katy C. Kao

6 Biobased Technology Commercialization: The Importance  
   of Lab to Pilot Scale-up .................................. 101  
   James P. Wynn, Robert Hanchar, Susanne Kleff, David Senyk  
   and Tonya Tiedje

Index ........................................................... 121