

# Contents

<b>Contributors</b>	x
<b>Foreword</b>	xii
<b>Acknowledgements</b>	xiii
<b>About the Editor</b>	xiv

## ***Part 1: Microbial Biotechnology: Present and Future Prospects***

- |  |   |
|--|---|
| 1. <b>Emerging Trends in Microbial Biotechnology: Energy and Environment</b> | 1 |
| Rajesh Arora   |   |

## ***Part 2: Harnessing Sustainable Energy Sources from Microbes***

- |   |    |
|---|----|
| 2. <b>The Microbiology of Microbial Electric Systems</b>                                  | 16 |
| Sarah A. Hensley, Madeline Vargas and Ashley E. Franks                                    |    |
| 3. <b>A Comparative Assessment of Bioelectrochemical Systems and Enzymatic Fuel Cells</b> | 39 |
| Deepak Pant, Gilbert Van Bogaert, Ludo Diels and Karolien Vanbroekhoven                   |    |
| 4. <b>Electrical Energy from Microorganisms</b>   | 58 |
| Sheela Berchmans  |    |
| 5. <b>Rumen Microbial Fuel Cells</b>  | 78 |
| Chin-Tsan Wang, Che-Ming J. Yang, Yung-Chin Yang  |    |

## ***Part 3: Mechanistics of Bioenergy Production***

- |  |     |
|--|-----|
| 6. <b>Systems Microbiology Approach to Bioenergy</b>                 | 97  |
| Qasim K. Beg and Ritu Sarin  |     |
| 7. <b>Nanotechnology and Bioenergy: Innovations and Applications</b> | 112 |
| Mrunalini V. Pattarkine  |     |
| 8. <b>Host Engineering for Biofuel-Tolerant Phenotypes</b>           | 148 |
| Becky J. Rutherford and Aindrila Mukhopadhyay                        |     |

#### ***Part 4: Bioenergy from Wastes and Pollutant Removal***

- |     |   |     |
|-----|---|-----|
| 9.  | <b>Microbial Fuel Cells: Electricity Generation from Organic Wastes by Microbes</b>                         | 162 |
|     | Kun Guo, Daniel J. Hassett and Tingyue Gu   |     |
| 10. | <b>Integration of Anaerobic Digestion and Oil Accumulation: Bioenergy Production and Pollutants Removal</b> | 190 |
|     | Mi Yan, Jianguo Zhang, Bo Hu  |     |
| 11. | <b>Biohydrogen Generation Through Solid Phase Anaerobic Digestion from Organic Solid Waste</b>              | 207 |
|     | S. Jayalakshmi  |     |

#### ***Part 5: Microalgae for Biofuels***

- |     |   |     |
|-----|---|-----|
| 12. | <b>Algae – A Novel Biomass Feedstock for Biofuels</b>   | 224 |
|     | Senthil Chinnasamy, Polur Hanumantha Rao, Sailendra Bhaskar, Ramasamy Rengasamy and Manjinder Singh |     |
| 13. | <b>Biofuel from Microalgae: Myth versus Reality</b>   | 240 |
|     | Jubilee Purkayastha, Hemanta Kumar Gogoi, Lokendra Singh and Vijay Veer                             |     |

#### ***Part 6: Bioremediation Technologies for Petroleum Hydrocarbons, PAHs and Xenobiotics***

- |     |  |     |
|-----|--|-----|
| 14. | <b>Biodegradation of Petroleum Hydrocarbons in Contaminated Soils</b>                | 250 |
|     | Aniefiok E. Ite and Kirk T. Semple   |     |
| 15. | <b>Bioremediation of Polycyclic Aromatic Hydrocarbons (PAHs)</b>                     | 279 |
|     | Carl G. Johnston and Gloria P. Johnston  |     |
| 16. | <b>The Role of Biological Control in the Creation of Bioremediation Technologies</b> | 297 |
|     | Yana Topalova  |     |

#### ***Part 7: Bioremediation of Nuclear Waste***

- |     |  |     |
|-----|--|-----|
| 17. | <b>Bioremediation of Uranium, Transuranic Waste and Fission Products</b> | 310 |
|     | Evans M.N. Chirwa  |     |

18. <b>Uranium Bioremediation: Nanotechnology and Biotechnology Advances</b>	349
Mrunalini V. Pattarkine	

***Part 8: Extremophilic Microbes: Role in Environmental Cleanup***

19. <b>Going Extreme for Small Solutions to Big Environmental Challenges</b>	363
Chris Bagwell	

<b>Index</b>	382
--------------	-----