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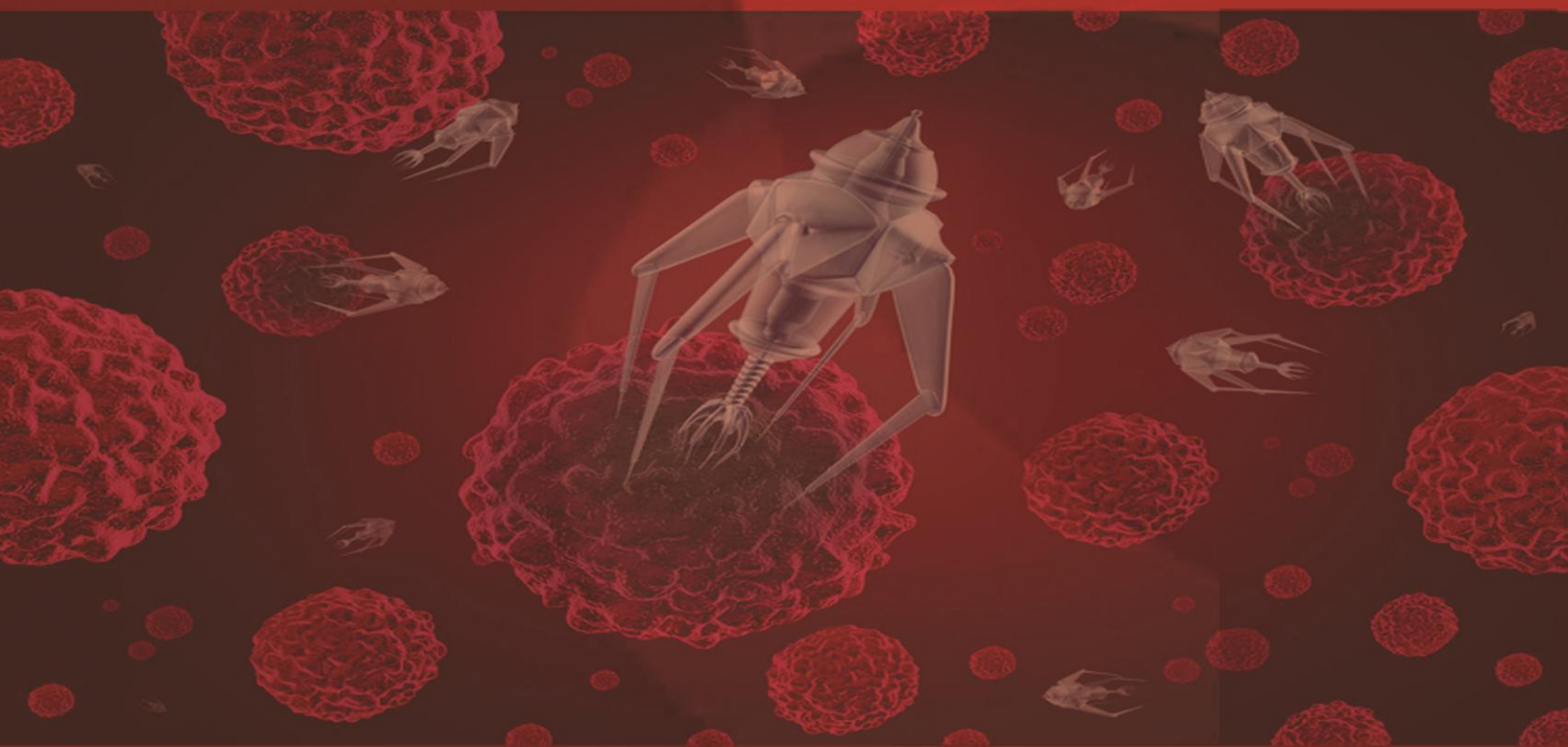
Emerging Technologies and Advanced Techniques for Waste Treatment and Energy Production

1st Edition

Editors

Prof. Ramasamy Subbaiya

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1st Edition

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Table of Contents

Contents		Page No.
Chapter-1 Emerging Technologies and Advancements in Wastewater Treatment Processes <i>A. Edward Peter and M. Geetha Manoharan</i>		1-19
1.1	Introduction	2
1.1.1	Major Contaminants in Industrial and Domestic Wastewater	3
1.1.2	Emerging Technologies for Wastewater Treatment	4
1.1.3	Blue PROTm Reactive Media Filtration	5
1.1.4	Phosphorus Recovery by Struvite or Calcium Phosphate Precipitation	6
1.1.5	Compressible Media Filtration (CMF)	8
1.1.6	Bioaugmentation	10
1.1.7	Magnetite Ballasted Activated Sludge (BioMag® Process)	12
1.1.8	Microbial Fuel Cell	14
1.1.9	Membrane Biofilm Reactor (MBfR)	16
1.2	Conclusion	18
	References	18
Chapter-2 Advanced Biomass Conversion Strategies <i>S. R. Ratchnashree, S. Ashwini and M. Masilamani Selvam</i>		20-31
2.1	Introduction	21
2.1.2	Pretreatment	21
2.1.3	Hydrolysis	22
2.1.4	Acid Hydrolysis	22
2.1.5	Enzyme Hydrolysis	22
2.1.6	Aerobic Digestion	22
2.1.7	Hydrolysis	23
2.1.8	Acidogenesis	23
2.1.9	Acetogenesis	23
2.1.10	Methanogenesis	24
2.1.11	Fermentation	25
2.1.12	Distillation	25
2.1.13	Thermochemical Process of Biomass Conversion	25
2.1.14	Combustion	25
2.1.15	Gasification	26
2.1.16	Process of Gasification	26
2.1.17	Simplified example reaction	27
2.1.18	Water-gas shift reaction	27

2.1.19	Components of Biomass	27
2.1.20	Gasifiers	27
2.1.21	Fixed - Bed Gasifiers	27
2.1.22	Counter-Current (or) Updraft Gasifiers	27
2.1.23	Cocurrent (or) Downdraft Gasifiers	28
2.1.24	Fluidized - Bed Gasifiers	28
2.1.25	Data analysis	29
2.2	Conclusion	30
	References	30
	Chapter-3 Innovations in Nanotechnology for Waste Water Treatment <i>T. H. Sukirtha and Mohanadoss Ponraj</i>	32-48
3.1	Introduction	33
3.1.1	Proposed System	33
3.1.2	Nanofiltration	33
3.1.3	Importance of nanofiltration system	34
3.1.4	The five steps of the NF rejection mechanism are as follows	35
3.1.5	Preferential sorption/Capillary rejection	35
3.1.6	Solution diffusion	35
3.1.7	Charged capillary	35
3.1.8	Textile effluent treatment via nanofiltration	35
3.1.9	Nanofiltration Membrane Softening	37
3.1.10	Applications of NF Technology	38
3.1.11	Nano-adsorbents in wastewater treatment	38
3.1.12	Nano-Adsorbents	38
3.1.13	Nanocomposites	39
3.1.14	Carbon Nanotubes	39
3.1.15	Graphene Based Nano-Adsorbents	40
3.1.16	Magnetic Nanocomposites	40
3.1.17	Advantages, Disadvantages and Future Perspectives of Nanosorbents	41
3.1.18	Nanophotocatalysts	42
3.1.19	Advantage and Disadvantages of Nanophotocatalyst	43
3.2	Conclusion	44
	References	45
	Chapter-4 Utilization of Lignocellulosic Biomass <i>D. Joyce Hellen Sathya, V. Varalakshmi and K. Sathish Kumar</i>	49-62
4.1	Introduction	50
4.1.1	Components of Lignocellulose	50
4.1.2	Characterization of Lignocellulosic Biomass	50

4.1.2.1	Renewability	50
4.1.2.2	Richness	51
4.1.2.3	Alternative	51
4.1.2.4	Reduction in GHGs	51
4.1.2.5	Degradation	51
4.1.2.6	Molecular Weight	51
4.1.3	Elements of Lignocellulose	51
4.1.4	Applications of Lignocellulose in the Production of Biofuels	51
4.1.5	Biofuel	51
4.1.6	Bioethanol	52
4.1.7	Thermochemical Route	52
4.1.8	Biochemical Route	52
4.1.9	Challenges in Bioethanol Production	52
4.1.10	Simultaneous Saccharification and Fermentation	52
4.1.11	Pretreatment of Lignocellulosic Biomass	53
4.1.12	Recent Advancement in Uses of Lignocellulosic Biomass	53
4.1.13	Lignocellulose in Bioplastic Production	53
4.1.14	Uses of Lignin	54
4.1.15	100% Bio Based Furniture Board	54
4.1.16	Domtar	54
4.1.17	Car Interiors	54
4.1.18	Bio-Asphalt	54
4.1.19	Bioadhesive and Mucoadhesive Drug Delivery System	55
4.1.20	Carbon Sequestration	55
4.1.21	Thermoset plastics	55
4.1.22	Utilization of Hemicellulose	55
4.1.23	Hydrogels	55
4.1.24	Conducting Polymers	56
4.1.25	Medical Applications	56
4.2	Conclusion	56
	References	56
	Chapter-5 Microbial Nanotechnology for Bioremediation of Pollutants <i>Kalirajan Arunachalam*, Vinod Kumar Nathan, Ragunath Ravichandiran, S. Rajeshkumar, Ramasamy Subbaiya, Lovleen Marwaha, George Mukupa, Abigail Mbozi, Abigail Mboshi, Munsaka Siankuku and Dany Banda</i>	63-78
5.1	Introduction	64
5.2	Microbial Nanotechnology for Bioremediation of Pollutants	65
5.2.1	Microbial Synthesis of Nanoparticles	65
5.3	Nanoparticles in Soil and Groundwater Remediation	66

5.4	Microbial Nanotechnology for Remediation of Industrial Wastewater	69
5.5	Microbial Nanotechnology in Heavy Metal Remediation	70
	References	72
	Chapter-6 Heavy Metal Contamination of Soil and Effect of Phytoremediation <i>A. Nirmala and P. Baby Shakila</i>	79-100
6.1	Introduction	80
6.1.1	Source of Metal Pollution	81
6.1.2	Contamination by Pesticides	82
6.1.3	Fertilizers	82
6.1.4	Biosolids and Manures	83
6.1.5	Metal Mining and Milling Processes and Industrial Wastes	83
6.1.6	Wastewater as Source of Heavy Metals	84
6.1.7	Air-borne sources	84
6.1.8	Heavy Metal Impacts on Humans and Plants	84
6.1.8.1	Cadmium	84
6.1.8.2	Copper	85
6.1.8.3	Iron	85
6.1.8.4	Lead	86
6.1.9	Effects of Heavy Metals on Aquatic Environment	86
6.1.10	Heavy Metals Effects on Composting Process	87
6.1.11	Phytoremediation Technology	87
6.1.12	Phytostabilization	88
6.1.13	Phytoextraction	89
6.1.14	Phytovolatilization	91
6.1.15	Phytofiltration	92
6.1.16	Using Microbes to Improve Plant Performance	92
6.2	Factors Affecting the Phytoremediation Mechanisms	92
6.2.1	Selection of plant species	92
6.2.2	Media Properties	93
6.2.3	Root Zone	93
6.2.4	Biological Uptake	93
6.2.5	Addition of Chelating Agent	93
6.3	Conclusion	94
	References	95
	Chapter-7 Recent Developments in Microbial Fuel Cells <i>Suresh Dhanaraj and A. K. Kathiresan</i>	101-111
7.1	Introduction	102
7.1.1	Microorganisms	102

7.1.2	Microbial Fuel Cells (MFCs)	102
7.1.3	Organic substrates or wastes used for bioelectricity generation	104
7.1.4	Design of MFC chamber for bioelectricity generation	104
7.1.5	Two Chamber MFC	104
7.1.6	One chamber MFC	104
7.1.7	Modeling and simulation of MFCs	104
7.1.8	Proton Exchange Membranes (PEM)	105
7.1.9	Role of Mediators in Bioelectricity Generation	105
7.1.10	Applications	106
7.1.11	Bioelectricity production from MFC	106
7.1.12	Wastewater Management and Bioelectricity Generation	106
7.1.13	MFCs as Biosensors	106
7.2	Conclusions	107
	References	107
	Chapter-8 Persistent Organic Pollutants Removal <i>Murali Dadi and Mohd Yasir</i>	112-131
8.1	Introduction	113
8.1.1	Types of POPs and their effects	114
8.1.2	Intentionally Generated POPs	115
8.1.3	Endrin	115
8.1.4	Aldrin and Dieldrin	115
8.1.5	Chlordane	115
8.1.6	Heptachlor	116
8.1.7	Hexachlorobenzene (HCB)	116
8.1.8	Toxaphene	117
8.1.9	DDT	117
8.1.10	Unintentionally Generated POPs	117
8.1.11	Polycyclic Aromatic Hydrocarbons (PAHs)	117
8.1.12	Polychlorinated Dibenzo-p-dioxins and Dibenzofurans (PCDD/Fs)	118
8.1.13	Sources of POPs	118
8.1.14	Removal of Persistent Organic Pollutants	121
8.1.15	Treatment Methods for Removal of POPs	121
8.1.16	Biodegradation	121
8.1.17	Thermal Degradation of POPs	122
8.1.18	Electrochemical remediation of POPs	123
8.1.19	Photocatalytic Degradation of POPs	124
8.1.20	Treatment of POPs using Nanocomposites	124
8.1.21	Graphene-Oxide Nanocomposite	125
8.1.22	Green Nanoparticles	126
8.2	Conclusions	127

	Acknowledgments	127
	Conflict of interest	127
	References	127
	Chapter-9 Pre-treatment Technologies through Adsorption Studies of Copper (II) Ions from Aqueous Solution using Kalulushi Clay and Iron Oxide Adsorbents <i>Libbohale, Adwell and Kalebaila Kabaso Kennedy</i>	133-144
9.1	Introduction	134
9.2	Experimental Section	135
9.2.1	Materials	135
9.2.2	Elemental Characterization of the Adsorbents	135
9.2.3	X-ray Fluorescence (XRF) Analysis	135
9.2.4	Inductively Coupled Plasma-Optical Emission Spectrometry (ICP) Analysis	135
9.2.5	Thermal and Acid Activation of Adsorbents	136
9.2.6	Stock Solution Preparation Adsorption Experiments	136
9.2.7	The Effect of Concentration on the Adsorption of Metal Ions	136
9.2.8	The Effect of pH on the Adsorption of Metal Ions	137
9.3	Results and Discussion	137
9.3.1	Characterization of Adsorbents	137
9.3.2	X-ray Fluorescence Analysis and Inductively Coupled Plasma-Optical Emission Spectrometry (ICP-OES) Analysis	137
9.3.3	Adsorption Experiments	138
9.3.4	The Effect of Concentration on the Adsorption of the Metal ions	138
9.3.5	The Effect of pH on the Adsorption of Metal Ions	140
9.4	Conclusion	142
	Acknowledgements	143
	References	143
	Chapter-10 Renewable Energy Generation through Lignocellulosic Biomass <i>Moffat Mutebele, Monde L. Ngenda, Ruth Bweembelo and Boby Samuel</i>	145-157
10.1	Introduction	146
10.1.1	Recent Benefits of Lignocellulosic Biomass across Nations	146
10.1.2	Biomass Renewal Utilization Process	147
10.1.3	Lignin Utilization	147
10.1.4	Hemicellulose Utilization	148
10.1.5	Cellulose Utilization	148
10.1.6	Utilization of Linocellulose Biomass	148

10.1.7	Making Biofuel from Plant Cell Walls rather than Starch	149
10.1.8	Ethanol Production from Lignocellulosic Biomass	150
10.1.9	Production of Ethanol	151
10.1.10	Pretreatment of Lignocellulosic Biomass	152
10.1.11	Heat	153
10.1.12	Lignocellulosic Feedstocks for Chemicals	154
10.1.13	Yeast Derived from Lignocellulosic Biomass as a Sustainable Feed Resource for Use in Aquaculture	155
10.2	Conclusion	156
	Acknowledgement	156
	References	157
	Chapter-11 Microplastics: Existence, Impact, and Advanced Removal Strategies <i>R. Sabarish, M. Prakash, N. Karmegam, M. Biruntha</i>	158-166
11.1	Introduction	159
11.2	Types of microplastics	159
11.3	Impact of microplastics on living beings	161
11.4	Existing and advanced microplastics removal	162
11.5	Conclusions	164
	Acknowledgement	164
	References	164

Preface

Wastewater treatment facilities use up to 5% of the world's energy, although only 25% of those plants effectively clean the water they utilize. Imagine the possibilities if the remaining 85% of the world's untreated water was treated in a manner that allowed the plants to generate electricity from the wastewater while also sufficiently treating the water. Coal-fired power plants in developed nations might all be shut down if wastewater treatment facilities started producing their own energy instead of using it, according to research studies. The collection of solid sludge is the first step in the treatment process for wastewater in sewage treatment plants. This sludge then goes through a pretreatment process known as thermal hydrolysis in a system that converts sludge to energy in order to increase the quantity of methane that it is able to generate. After that, the trash that has been treated goes into an anaerobic digester, which completes the process of breaking it down. The end result is a methane-rich gas known as biogas, which may be used to satisfy the facility's immediate energy requirements, or it can be refined further and used in lieu of natural gas. Even though it's a mouthful to say, "bioelectrochemistry" is a term you should get acquainted with if you're interested in environmentally friendly and resource-conserving methods of treating wastewater from industrial processes. The process involves bacteria with specialized abilities, such as producing and consuming power while treating and detecting contaminants in wastewater. Microbial fuel cells (MFCs) have received a lot of interest in recent decades because they can employ biodegradable substrates as fuel under very benign working conditions. In more recent years, scientists have shown that this is a foundation for technological development, which expands the potential uses of MFCs considerably. In wastewater treatment facilities, MFCs may be used to decompose organic matter and generate energy; they have also been studied for other potential uses, such as biosensors and in the biohydrogen processing industry. In order to conserve energy and deal with environmental challenges, MFCs have been acknowledged as an interesting and challenging technology for parallel wastewater treatment. MFCs have shown to be a workable strategy for reducing the need for chemical oxygen while also generating electricity. Power generated from renewable resources such as the biowaste and biomass is infinite in supply. Renewable sources of energy may be used to power electric generators, heat and cool buildings and water, and power vehicles. In contrast, nonrenewable energy sources like fossil fuels are limited and eventually depleted. Numerous sectors, including the economy, ecology, national security, and human health, benefit from the use of renewable

energy sources. Some advantages of renewable energy use in the developed countries are listed such as increased grid security, safety, and resilience; Employment opportunities in the renewable energy sector, lowered energy-related air pollution and carbon emissions, greater accessibility, since many forms of renewable energy now compete on price with more conventional ones, Increased availability of renewable energy sources in outlying areas and on islands without access to the traditional power system.

This book represents cutting-edge waste treatment and renewable energy generation technologies, as well as the usage and creation of renewable energy from biowaste, affect the efficacy of treatment technologies. Thermochemical treatment procedures such as incineration, pyrolysis, and gasification are effective for wastes with low organic content and moisture levels. When compared to other waste treatment methods, anaerobic digestion stands out as the best option for nations still working to improve their infrastructure. It is only necessary to promote these technologies on a bigger scale with the aid of Government subsidies, programmers, and laws because of their proven environmental friendliness, efficiency, and economy. Growing public understanding of the need of sustainable waste management is also essential.

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R. Subbaiya Ph.D., is working as an Associate Professor in the Department of Biological Sciences, School of Mathematics and Natural Sciences, The Copperbelt University, Kitwe, Zambia. His research interests include Microbiology, Nanobiotechnology, Biogas, Biofuel, Bioenergy and Waste Management. He is having more than 15 years of Teaching Experience. To his credit, He has Received a **“Young Scientist Award”** from “Tamil Nadu State Council for Science and Technology”, Chennai, India in the year of 2011 and he had received **“Outstanding Best Paper Award”** from “Nature Science Foundation, Coimbatore” for the Research paper entitled “Synthesis of bioactive compounds from vermicast isolated actinomycetes species and its antimicrobial activity against human pathogenic bacteria” *Microbial Pathogenesis*. (2018), In addition to that he has received **“The IET Premium Awards 2019”** for the Research paper entitled “Biomimetic synthesis of silver nanoparticles from *Streptomyces atrovirens* and their potential anticancer activity against human breast cancer cells”, *IET-Nanobiotechnology*. He had received the funded projects from AICTE and DST-NIMAT. He had filed two Indian patents and published more than 78 Research and Review articles in reputed journals with a cumulative impact factor of above 300 and published 10 Book chapters to his credit. He is serving as a Reviewer for several Indexed Journals. Presented papers and attended more than 30 National and International Conferences. He is also a life member of Society for Biotechnology and Indian Lichenological Society, Life Member in Indian Society for Technical Education (ISTE).



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