

Contents

1	Nanoparticles Synthesized by Microorganisms	1
1.1	Introduction	1
1.2	Metallic Nanoparticles	4
1.2.1	Gold Nanoparticles	7
1.2.2	Silver Nanoparticles	12
1.2.3	Cadmium Nanoparticles	18
1.3	Alloy Nanoparticles	20
1.3.1	Gold—Silver (Au—Ag) Nanoparticles	20
1.4	Oxide Nanoparticles	22
1.4.1	Cerium Oxide Nanoparticles	22
1.4.2	Silica Dioxide Nanoparticles	24
1.4.3	Titanium Oxide Nanoparticles	25
1.4.4	Iron Oxide Nanoparticles	26
1.4.5	Zirconium Dioxide (ZrO ₂) Nanoparticles	28
1.4.6	Antimony Trioxide (Sb ₂ O ₃) Nanoparticles	29
1.4.7	Copper Oxide (CuO) Nanoparticles	30
1.4.8	Zinc Oxide (ZnO)	30
1.5	Sulfide Nanoparticles	31
1.5.1	Cadmium Sulfide (CdS) Nanoparticles	32
1.5.2	Lead Sulfide (PbS) Nanoparticles	33
1.5.3	Iron Sulfide Nanoparticles	33
1.5.4	Copper Sulfide Nanoparticles	34
1.5.5	Silver Sulfide Nanoparticles	34
1.5.6	Zinc Sulfide (ZnS) Nanoparticles	35
1.5.7	Antimony Sulphide (Sb ₂ S ₃) Nanoparticles	37
1.6	Palladium and Platinum Nanoparticles	37
1.7	Selenium Tellurium Nanoparticles	38
1.8	Bismuth Nanoparticles	41
1.9	Conclusions and Future Perspectives	41
	References	42

2	Halophiles in Nanotechnology	53
2.1	Introduction	53
2.2	Nanoparticle Synthesis by Halophiles	56
2.2.1	Nanoparticle Synthesis by Halophilic Bacteria	56
2.2.2	Nanoparticle Synthesis by Halophilic Archaea	59
2.2.3	Nanoparticle Synthesis by Halophilic Fungi	62
2.2.4	Nanoparticle Synthesis by Halophilic Algae	65
2.3	Biomolecules Produced by Halophiles with Implications in Nanotechnologies	67
2.3.1	Exopolysaccharides from Halophiles	68
2.3.2	Gas Vesicles	74
2.3.3	Graphene Sheet	75
2.3.4	Halophilic Enzymes	77
2.4	Conclusions and Future Perspectives	80
	References	80
3	Thermophiles and Psychrophiles in Nanotechnology	89
3.1	Introduction	89
3.2	Synthesis of Nanoparticles by Thermophiles	92
3.2.1	Thermophilic Bacteria	92
3.2.2	Thermophilic archaea	105
3.2.3	Thermophilic Fungi	105
3.3	Thermophilic Enzymes in Nanotechnology	109
3.3.1	Immobilization of Thermozyms with Magnetic Nanoparticles	109
3.4	Synthesis of Nanoparticles by Psychrophiles	113
3.4.1	Synthesis of Nanoparticles by Psychrophilic Bacteria	113
3.5	Psychrophilic Enzymes in Nanotechnology	117
3.5.1	Pectate Lyase	117
3.5.2	Laccase	118
3.6	Future Perspectives	119
	References	120
4	Alkaliphiles and Acidophiles in Nanotechnology	129
4.1	Introduction	129
4.2	Synthesis of Nanoparticles by Acidophiles	132
4.2.1	Synthesis of Nanoparticles by Acidophilic Bacteria	132
4.2.2	Synthesis of Nanoparticles by Acidophilic Archaea	140
4.2.3	Synthesis of Nanoparticles by Acidophilic Fungi	142
4.3	Synthesis of Nanoparticles by Alkaliphiles	147
4.3.1	Spirulina platinensis	147
4.3.2	Pseudomonas alcaliphila	149
4.3.3	Bacillus licheniformis	150
4.4	Future Directions	152
	References	153

5 Application of Nanoparticles	163
5.1 Introduction	163
5.2 Biomedical Applications of BNPs	165
5.2.1 Bionanoparticles as Anti-microbial Agents	165
5.3 BNPs for Biosensing Applications	169
5.4 Bionanoparticles for Imaging	173
5.5 Bionanoparticles for Drug Delivery	175
5.6 Environmental Applications of BNPs	179
5.6.1 BNPs for Environmental Remediation.	179
5.6.2 Application of BNPs in Water Treatment	181
5.6.3 Renewable Energy Source.	183
5.7 Final Conclusions and Remarks	184
References.	185
Erratum to: Extremophiles: Applications in Nanotechnology	E1

Extremophiles: Applications in Nanotechnology

Tiquia-Arashiro, S.M.; Rodrigues, D.F.

2016, XIX, 193 p. 48 illus., 34 illus. in color., Hardcover

ISBN: 978-3-319-45214-2