

1. Record Nr.	UNINA9910830936503321
Autore	Rajkhowa Sanchayita
Titolo	Handbook of Ionic Liquids : Fundamentals, Applications and Sustainability
Pubbl/distr/stampa	Newark : , : John Wiley & Sons, Incorporated, , 2024 ©2024
ISBN	3-527-83952-6 3-527-83950-X
Edizione	[1st ed.]
Descrizione fisica	1 online resource (520 pages)
Altri autori (Persone)	SinghPardeep SenAnik SarmaJyotirmoy
Disciplina	546.34
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Cover -- Title Page -- Copyright -- Contents -- Preface -- Chapter 1 History and Development of Ionic Liquids -- 1.1 Introduction -- 1.2 Constituents of ILs -- 1.3 The Brief History -- 1.4 Ionic LiquidLike Systems -- 1.5 The Generation of ILs -- 1.5.1 FirstGeneration ILs -- 1.5.2 SecondGeneration ILs -- 1.5.3 ThirdGeneration ILs -- 1.6 Structural Development of ILs -- 1.6.1 TaskSpecific ILs (TSILs) -- 1.6.2 Chiral ILs -- 1.6.3 Switchable Polarity Solvent ILs -- 1.6.4 BioILs -- 1.6.5 PolyILs -- 1.6.6 Energetic ILs -- 1.6.7 Metallic ILs -- 1.6.8 PILs -- 1.6.9 Acidic ILs -- 1.6.10 Basic ILs -- 1.6.11 Neutral ILs -- 1.6.12 Supported ILs -- 1.6.13 Magnetic ILs -- 1.7 Scope of ILs -- 1.8 Commercialization of ILs -- 1.9 Conclusions -- Acknowledgments -- References -- Chapter 2 Growth of Ionic Liquids and their Applications -- 2.1 Introduction -- 2.1.1 Cations -- 2.1.2 Anions -- 2.2 Growth of Ionic Liquids -- 2.2.1 Quaternization -- 2.2.2 Anion Exchange -- 2.2.3 Acid-Base Neutralization -- 2.2.4 Direct Combination -- 2.2.5 MicrowaveAssisted Synthesis -- 2.2.6 UltrasoundAssisted Synthesis -- 2.3 Applications of Ionic Liquids -- 2.3.1 Electrochemistry -- 2.3.1.1 Electrodeposition -- 2.3.1.2 Electrosynthesis -- 2.3.1.3 Electrocatalysis -- 2.3.2 Solvents and Catalysis -- 2.3.2.1 Ionic Liquids

as Solvents for Organic Synthesis -- 2.3.2.2 Ionic Liquids as Solvents for Inorganic Synthesis -- 2.3.2.3 Ionic Liquids as Catalysts for Organic Reactions -- 2.3.3 Separation -- 2.3.4 Heat Transport and Storage -- 2.3.5 Analytics -- 2.3.6 Engineering -- 2.3.7 Performance Additives -- 2.3.8 Biotechnology -- 2.4 Conclusion and Future Prospects -- References -- Chapter 3 Study of Physicochemical Properties of Ionic Liquids -- 3.1 Introduction -- 3.2 Physicochemical Properties of Ionic Liquids -- 3.2.1 Density -- 3.2.2 Melting Point. 3.2.3 Thermal Stability and Decomposition -- 3.2.4 Conductivity -- 3.2.5 Solubility -- 3.2.6 Surface Tension -- 3.2.7 Viscosity -- 3.2.8 Polarity -- 3.2.9 Diffusion -- 3.2.10 Vapor Pressure -- 3.2.11 Miscibility -- 3.3 Conclusion and Perspectives -- Acknowledgments -- References -- Chapter 4 Ionic Liquids as Green Solvents: Are Ionic Liquids Nontoxic and Biodegradable? -- 4.1 Introduction -- 4.2 Toxicity and Biodegradability of Ionic Liquids -- 4.2.1 Toxicological Effects and Toxicity Mechanisms of ILs -- 4.2.2 Scope of Biodegradable and Nontoxic ILs -- 4.3 Applications of Ionic Liquids as Green Solvents -- 4.3.1 Ionic Liquids as Green Solvents in Biomass Utilization and Extraction -- 4.3.2 Ionic Liquids as Green Solvents in Energy Applications -- 4.3.3 Ionic Liquids as Green Solvents in Biomedical Applications -- 4.4 IoNanofluids -- 4.4.1 Properties of INFs -- 4.4.2 Applications of INFs -- 4.4.3 Are IoNanofluids Nontoxic and Biodegradable? -- 4.5 Conclusion -- References -- Chapter 5 Promising Uses of Ionic Liquids on Carbon Carbon and Carbon Nitrogen Bond Formations -- 5.1 Introduction -- 5.2 Carbon Carbon Bond Formation Reactions -- 5.2.1 C C CrossCoupling Reactions -- 5.2.1.1 Heck Coupling -- 5.2.1.2 Suzuki Coupling -- 5.2.1.3 Sonogashira Coupling -- 5.2.1.4 Stille Coupling -- 5.2.1.5 Hiyama Coupling -- 5.2.2 Aldol Condensation -- 5.2.3 Claisen-Schmidt Condensation Reaction -- 5.2.4 Friedel-Crafts Alkylation -- 5.2.5 Diel-Alder Reaction -- 5.2.6 Henry Reactions -- 5.2.7 Other C C Bond Formation Reaction -- 5.3 Carbon Nitrogen Bond Formation Reaction -- 5.3.1 Biginelli Reaction -- 5.3.2 NAllylation Reactions -- 5.3.3 Mannich Reaction -- 5.3.4 Other C N Bond Formation Reactions -- 5.4 Conclusion -- References -- Chapter 6 Ionic Liquids in Separation Techniques -- 6.1 Introduction -- 6.2 General Characteristics of ILs. 6.3 The Use of ILs in Separation Technology -- 6.3.1 ILBased Solid-Liquid Extractions -- 6.3.2 Simple SLEs -- 6.3.3 MicrowaveAssisted Extractions -- 6.3.4 UltrasoundAssisted Extractions -- 6.3.5 Liquid-Liquid Extraction -- 6.3.6 ILs as Mobile Phase Additives in Liquid Chromatography -- 6.3.7 ILs Used as SurfaceBonded Stationary Phases -- 6.4 Conclusions and Future Perspectives -- References -- Chapter 7 Polymers and Ionic Liquids -- 7.1 Introduction -- 7.2 Properties of ILs -- 7.3 Synthesis of PILs -- 7.4 Types and Application of Common PILs -- 7.5 Conclusion -- References -- Chapter 8 Effect of Ionic Liquids on Electrochemical Biosensors and Other Bioelectrochemical Devices -- 8.1 Introduction -- 8.2 The Importance of Ionic Liquids in Electrochemistry -- 8.2.1 Larger Electrochemical Window -- 8.2.2 Ionic Conductivity -- 8.2.3 Hydrophobicity -- 8.2.4 Viscosity -- 8.2.5 Catalytic Performance -- 8.3 Fabrication of ILBased Sensing Layers -- 8.3.1 Direct Mixing -- 8.3.2 Physical Adsorption -- 8.3.3 Casting and Rubbing -- 8.3.4 Electrodeposition -- 8.3.5 Sol-Gel Encapsulation -- 8.3.6 LayerbyLayer (LbL) Method -- 8.3.7 SandwichType Immunoassay -- 8.4 ILBased Electrochemical Biosensors -- 8.4.1 Application of RTILs in Construction of Electrochemical Biosensors -- 8.4.1.1 CNMsILsBased Electrochemical Biosensor as Cancer Biomarker -- 8.4.1.2 CNMsILsBased Electrochemical Biosensor for Cardiac Diseases -- 8.4.1.3 CNMsILsBased Electrochemical Biosensor for

Immunoglobulins -- 8.4.1.4 CNMsILsBased Electrochemical Biosensor for Neurotransmitters -- 8.4.1.5 CNMsILsBased Electrochemical Glucose Biosensors -- 8.5 Application of Ionic Liquids in Bioelectrochemical Devices -- 8.6 Conclusions and Future Prospects -- References -- Chapter 9 Nanopharmaceuticals With Ionic Liquids: A Novel Approach -- 9.1 Introduction. 9.2 Applications of Ionic Liquids in Various Fields -- 9.3 Nanotechnology and Ionic Liquids -- 9.4 Use of Ionic Liquids in Nanocarrier Development (Reported Work) -- 9.5 Ionic LiquidAssisted Metal Nanoparticles -- 9.6 Conclusion -- References -- Chapter 10 Anticancer Activity of Ionic Liquids -- 10.1 Introduction -- 10.2 Classification of Ionic Liquids -- 10.3 Toxicity of Ionic Liquids -- 10.4 Anticancer Potential of Ionic Liquids -- 10.5 Conclusions and Future Scope -- References -- Chapter 11 Importance of Ionic Liquids in Plant Defense: A Novel Approach -- 11.1 Introduction -- 11.2 Generation of ILs and Their Application -- 11.3 Role of ILs in Plant Defense Mechanisms -- 11.3.1 ILs as Antibacterial Agents -- 11.3.2 ILs as Antifungal Agents -- 11.3.3 ILs as an Herbicide and Plant Growth Promoters -- 11.3.4 Effects of ILs as Deterrents -- 11.3.5 Application of ILs as Bioactive Formulations -- 11.3.6 Role of ILs in SAR Induction Mechanism -- 11.4 IL Products in Future Management of Agri Industries: An Innovative Approach -- 11.5 Conclusions -- References -- Chapter 12 Theoretical Description of Ionic Liquids -- 12.1 Introduction -- 12.2 Ionic Liquid Dynamics -- 12.2.1 SelfDiffusion -- 12.2.2 Viscosity -- 12.3 Theoretical Advances in Force Fields and Electronic Structures -- 12.4 Mixtures in Ionic Liquids -- 12.4.1 Ionic Liquids and Interfaces -- 12.4.2 Ionic Liquids and Water -- 12.5 Applications of Ionic Liquids in Chemical Processes -- 12.5.1 Preamble -- 12.5.2 Separation and Purification -- 12.5.3 Reaction Media in Chemical and Biochemical Catalysis -- 12.6 Future Developments -- 12.7 Conclusion -- References -- Chapter 13 Theoretical Understanding of Ionic Liquid Advancements in the Field of Medicine -- 13.1 Introduction -- 13.2 A Brief History of Ionic Liquids and Deep Eutectic Solvents -- 13.3 Biomedical Applications. 13.3.1 Solubilization of Drugs -- 13.3.2 Protein Stabilization -- 13.4 Summary and Future Aspects -- 13.4.1 Developing a Microscopic Understanding to Enable TaskSpecific Design -- References -- Chapter 14 Recent Developments in Ionic Liquid Research from Environmental Perspectives -- 14.1 Introduction -- 14.2 Applications of Ionic Liquids -- 14.2.1 Ionic Liquids as Solvents and Catalysts -- 14.2.2 Ionic Liquids in Analytical Chemistry -- 14.2.3 Ionic Liquids in Electrochemical Applications -- 14.2.3.1 In Electrodeposition -- 14.2.3.2 Energy Management -- 14.2.3.3 Bioscience -- 14.2.3.4 Biomechanics -- 14.2.4 Ionic Liquids in Industrial Applications -- 14.2.5 Ionic Liquid as Lubricants -- 14.2.6 Ionic Liquids as a Corrosion Resistant Material -- 14.2.7 Ionic Liquids as Additives in Drilling Fluid -- 14.2.8 Ionic Liquids as Absorbents in Gas Capturing -- 14.2.9 Ionic Liquid Crystals -- 14.2.10 Ionic Liquids in Biomedical Applications -- 14.3 Limitations of Ionic Liquids -- 14.4 Conclusion -- References -- Chapter 15 Ionic Liquids for Sustainable Biomass Conversion in Biorefinery -- 15.1 Introduction -- 15.2 Biomass as a Source of Organic Compounds and Fuels -- 15.3 Biomass Conversion Process -- 15.3.1 Thermochemical Process -- 15.3.2 Lignin Extraction Processes -- 15.3.3 Enzymatic Processes -- 15.4 ValueAdded Organic Compounds from Biomass in Ionic Liquids -- 15.5 Production of Biodiesel with Ionic Liquids -- 15.6 Toxicity and Ecotoxicity of ILs for Biorefinery -- 15.6.1 Toxicity of ILs Used in Biorefinery -- 15.6.2 Biodegradation of ILs Used in Biorefinery -- 15.6.3 Conclusion

Regarding Toxicity and Biodegradation of ILs -- 15.7 Conclusions --
References -- Chapter 16 Ionic Liquids for Atmospheric CO₂ Capture: A
TechnoEconomic Assessment -- 16.1 Introduction -- 16.2 Different
Processes of CO₂ Capture -- 16.2.1 Membrane Separation.
16.2.2 Cryogenic Separation.
