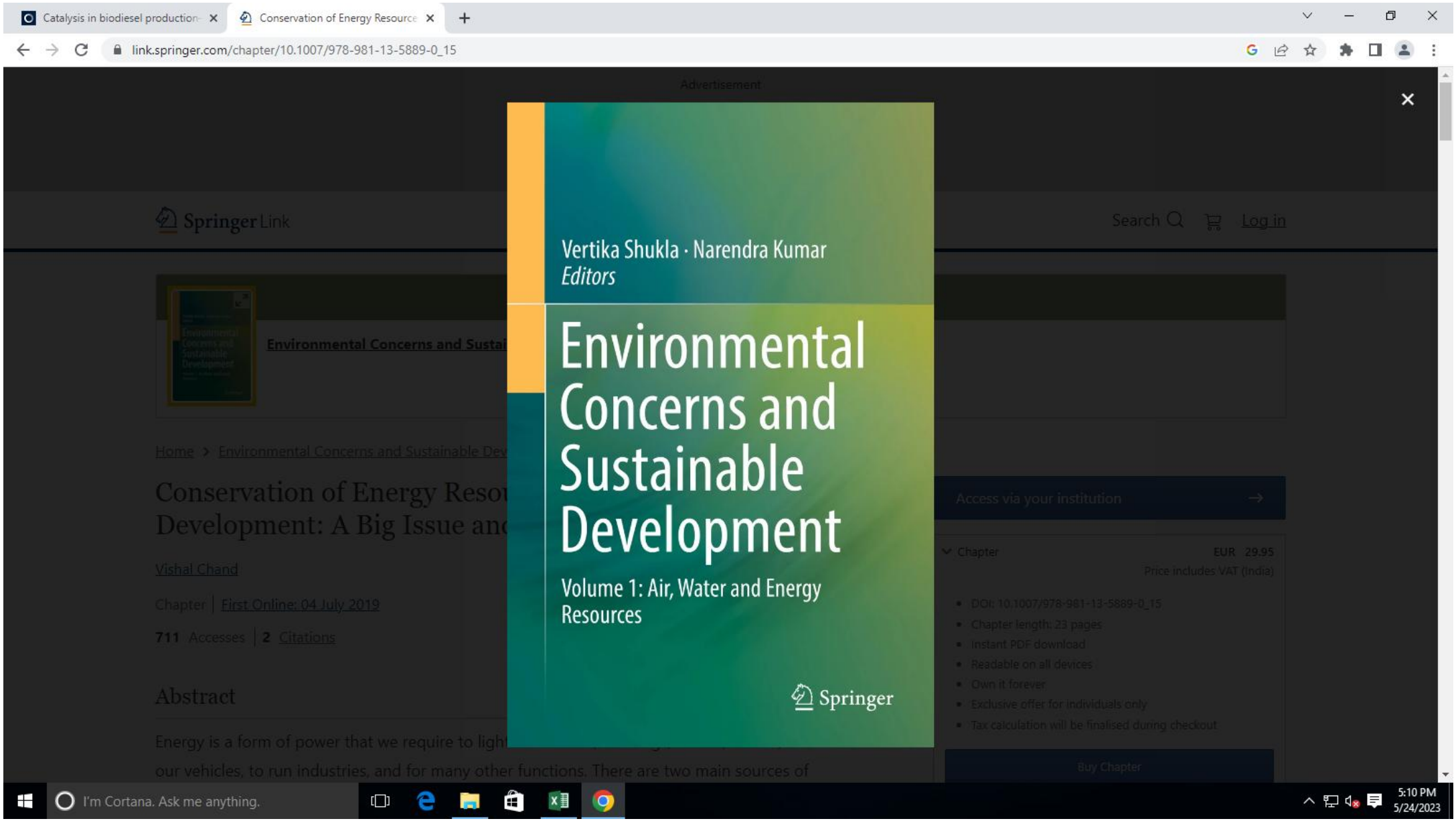
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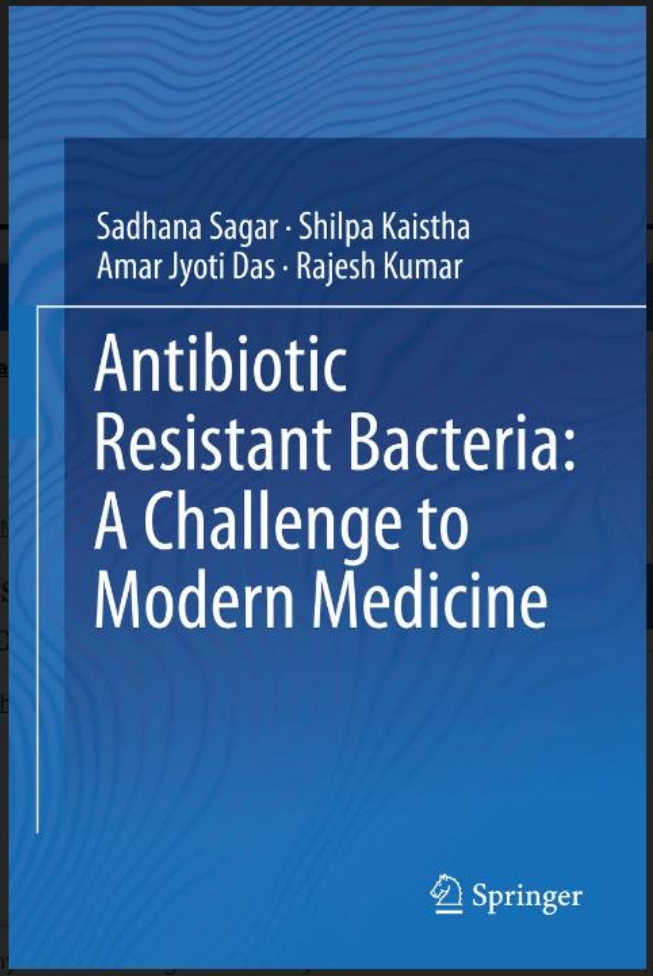
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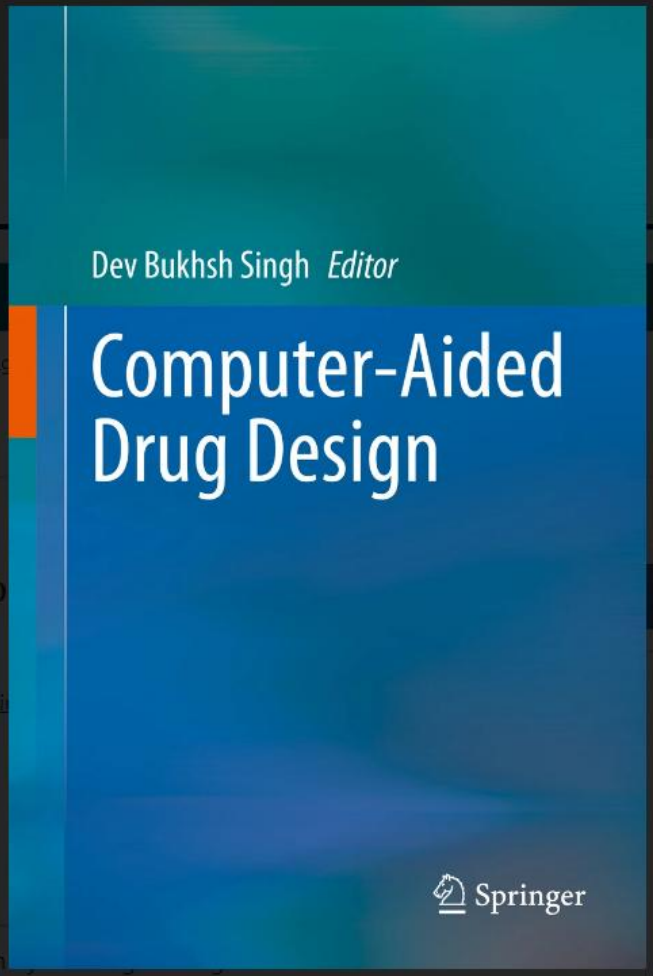
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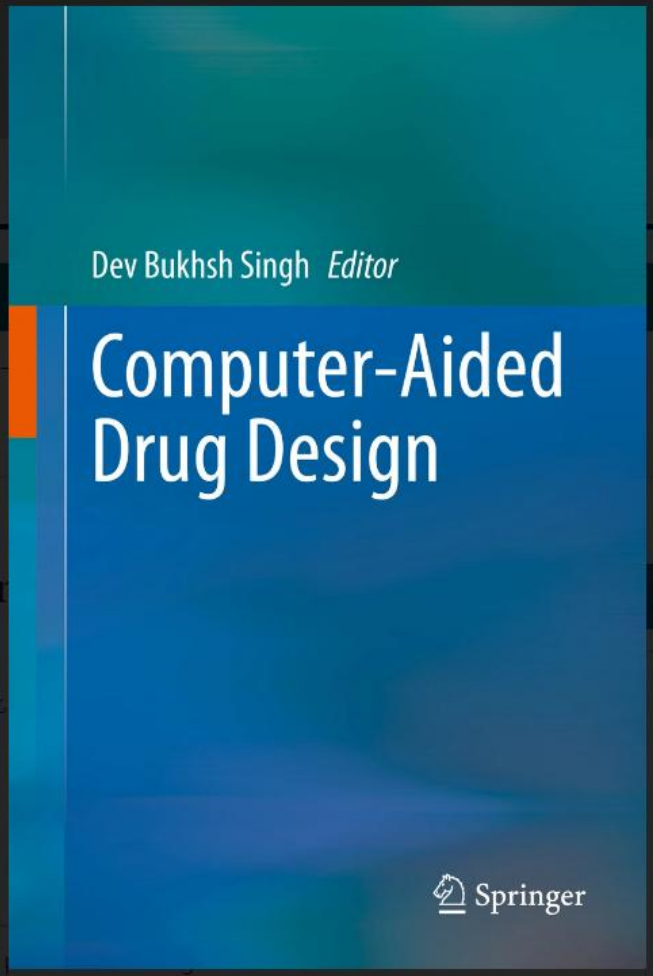
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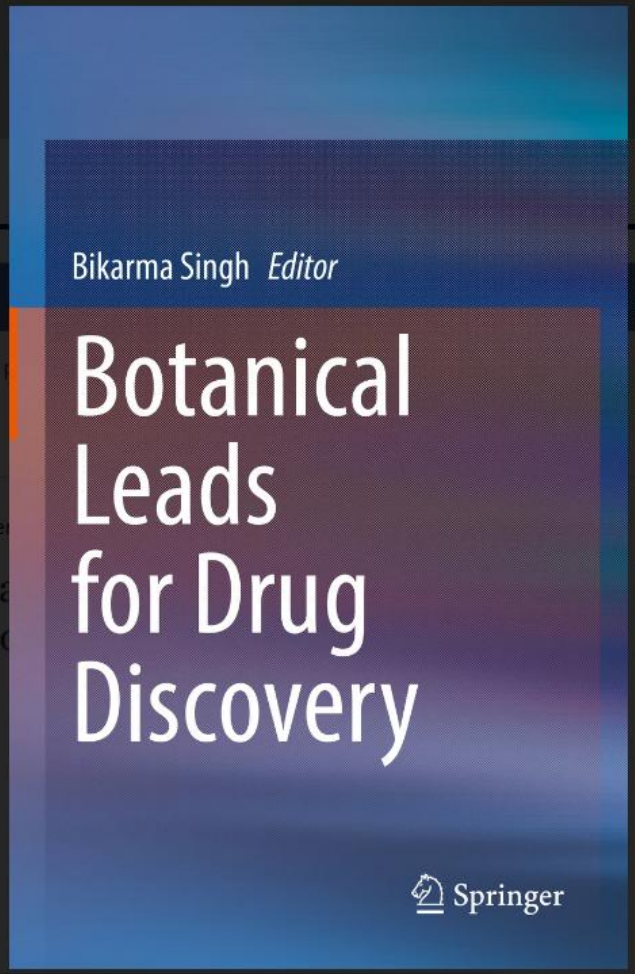
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This book offers an authoritative review of biopharmaceuticals and their clinical relevance.

Nanotechnology Applications for Food Safety and Quality Monitoring

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Abstract

Nanotechnology has received great attention from researchers, scientists, and food technologists for application in food and pharma industries because of their promising outcomes. Due to their increasing consciousness for their health, people are exploring

Green Solutions
for
Industrial Sustainability

Editor

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University Institute of Engineering & Technology,
CSJM University, Kanpur

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Preface

The world is facing unprecedented environmental challenges that demand immediate and innovative solutions. Industrial activities have contributed significantly to environmental degradation, and they also have a crucial role in reversing the negative trends. The industries that embrace sustainable practices can reduce their environmental footprint and create a more resilient future.

This book aims to present an overview of some of the latest developments in sustainable industrial practices. The chapters cover diverse topics, such as biogreases for environment-friendly lubrication, the use of biotechnology in the leather industry, chromium remediation in tanning, rainwater harvesting, waste management, water treatment, energy efficiency, and measurement uncertainty in Industry 4.0.

The chapters draw upon the latest research and practical experiences to provide insights into the challenges and opportunities for sustainable industrial practices. The authors offer an interdisciplinary perspective that highlights the need for collaboration among researchers, industry, policymakers, and communities to achieve sustainability goals.

The book's target audience includes researchers, engineers, managers, policymakers, and students who are interested in sustainable industrial practices. The book can be used as a reference for courses on sustainable engineering, environmental science, and industrial ecology.

The editor and authors hope that this book will inspire further research, innovation, and action towards a more sustainable industrial future.

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Advanced Topics in Chemical Engineering and Sustainable Technologies

(Set of Two Volumes)

Volume – 2

Editor

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Preface

Chemical and Materials engineering has played a vital role in advancing the field of sustainable technologies, enabling the development of processes that can promote economic growth while protecting the environment. The challenges we face today in areas such as energy, healthcare, and food production require innovative solutions that can be achieved through multidisciplinary research and the integration of advanced technologies.

This book presents a collection of chapters covering some of the latest research and developments in chemical engineering and sustainable technologies. The book is divided into nine chapters that cover a range of topics, including materials for energy storage, environmental sustainability, and green chemistry.

Chapter 1 focuses on materials for fuel cell applications, which is a promising technology for clean energy production. Chapter 2 discusses anti-icing additives for various fuels, which is crucial for safe and efficient fuel transportation in cold climates. Chapter 3 presents the application of monoliths for toluene disproportionation, an important process in the petrochemical industry. Chapter 4 and Chapter 5 discuss the heat and mass transfer through porous media and the effect of surface wettability on two-phase flow. Chapter 6 examines the study of mass and heat transfer through porous medium in the presence of a magnetic field, which has potential applications in the energy and aerospace industries.

Chapter 7 and Chapter 8 discuss different types of membranes which are promising candidates for solid oxide fuel cells and as oxygen separation membranes. Finally, Chapter 9 examines India's readiness for Industry 4.0, which is a global trend towards automation and data exchange in manufacturing technologies.

We hope that this book will serve as a valuable reference for researchers, students, and professionals in the field of chemical engineering and sustainable technologies. The contributions in this book demonstrate the critical role of chemical engineering in achieving sustainable development and highlight some of the key challenges and opportunities in this field. We believe that the topics covered in this book will inspire further research and development in this important area of study.

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Preface

The field of chemical engineering is constantly evolving, and new technologies and processes are being developed to meet the challenges of a rapidly changing world. As we strive to develop sustainable and efficient solutions, it is important to explore innovative ideas and methods that can help us achieve these goals.

This book aims to provide a comprehensive overview of some of the latest advances in chemical engineering and sustainable technologies as a collection of research papers and case studies. The book begins with a chapter on the numerical analysis of mass transfer in circular micro-channels for slug flow, which provides an overview of the behavior of fluids in micro-channels, an area of increasing interest due to its potential for applications in microfluidics and lab-on-a-chip devices. This is followed by a chapter on monolithic reactors for hydroisomerization of ethylbenzene, which discusses the use of this type of reactor in the production of high-quality fuels and chemicals.

The next chapter focuses on catalysts for biodiesel production, providing insights into the latest developments in the field and highlighting the potential of biodiesel as a sustainable alternative to fossil fuels. The role of chemistry in waste management is then explored, with a chapter dedicated to this topic, discussing the chemical processes involved in the treatment and disposal of waste.

The book also includes a chapter on the study of heat and mass transfer through a channel filled with a porous medium with heated plates and the behavior of an inclined magnetic field. The status and challenges of laser ignition vehicles are discussed in the following chapter, highlighting the potential of this technology in reducing emissions and improving fuel efficiency. Another chapter of the book discusses the potential of municipal solid waste as a source of

energy, exploring various techniques for waste-to-energy conversion. The next chapter is on oxygen permeable inorganic membranes, discussing their potential applications in oxygen separation and other fields.

The book concludes with a chapter on the Corey-Bakshi-Shibata (CBS) catalyst, a chiral catalyst widely used in organic chemistry for enantioselective reductions of ketones and imines. The chapter discusses the synthesis and application of this catalyst in industrial operations..

By examining these topics, we hope to provide readers with a comprehensive understanding of the latest advancements in chemical engineering and sustainable technologies.

We would like to express our gratitude to the authors who contributed their time and expertise to make this book possible. We would also like to thank the readers for their interest in this book and hope that it provides valuable insights and inspires new ideas and approaches in the field of chemical engineering.

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Volume – 1

Editor

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Preface

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We hope that this book will serve as a valuable reference for researchers, students, and professionals in the field of chemical engineering and sustainable technologies. The contributions in this book demonstrate the critical role of chemical engineering in achieving sustainable development and highlight some of the key challenges and opportunities in this field. We believe that the topics covered in this book will inspire further research and development in this important area of study.

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Volume – 1

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The field of chemical engineering is constantly evolving, and new technologies and processes are being developed to meet the challenges of a rapidly changing world. As we strive to develop sustainable and efficient solutions, it is important to explore innovative ideas and methods that can help us achieve these goals.

This book aims to provide a comprehensive overview of some of the latest advances in chemical engineering and sustainable technologies as a collection of research papers and case studies. The book begins with a chapter on the numerical analysis of mass transfer in circular micro-channels for slug flow, which provides an overview of the behavior of fluids in micro-channels, an area of increasing interest due to its potential for applications in microfluidics and lab-on-a-chip devices. This is followed by a chapter on monolithic reactors for hydroisomerization of ethylbenzene, which discusses the use of this type of reactor in the production of high-quality fuels and chemicals.

The next chapter focuses on catalysts for biodiesel production, providing insights into the latest developments in the field and highlighting the potential of biodiesel as a sustainable alternative to fossil fuels. The role of chemistry in waste management is then explored, with a chapter dedicated to this topic, discussing the chemical processes involved in the treatment and disposal of waste.

The book also includes a chapter on the study of heat and mass transfer through a channel filled with a porous medium with heated plates and the behavior of an inclined magnetic field. The status and challenges of laser ignition vehicles are discussed in the following chapter, highlighting the potential of this technology in reducing emissions and improving fuel efficiency. Another chapter of the book discusses the potential of municipal solid waste as a source of

energy, exploring various techniques for waste-to-energy conversion. The next chapter is on oxygen permeable inorganic membranes, discussing their potential applications in oxygen separation and other fields.

The book concludes with a chapter on the Corey-Bakshi-Shibata (CBS) catalyst, a chiral catalyst widely used in organic chemistry for enantioselective reductions of ketones and imines. The chapter discusses the synthesis and application of this catalyst in industrial operations..

By examining these topics, we hope to provide readers with a comprehensive understanding of the latest advancements in chemical engineering and sustainable technologies.

We would like to express our gratitude to the authors who contributed their time and expertise to make this book possible. We would also like to thank the readers for their interest in this book and hope that it provides valuable insights and inspires new ideas and approaches in the field of chemical engineering.

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Chemical and Materials engineering has played a vital role in advancing the field of sustainable technologies, enabling the development of processes that can promote economic growth while protecting the environment. The challenges we face today in areas such as energy, healthcare, and food production require innovative solutions that can be achieved through multidisciplinary research and the integration of advanced technologies.

This book presents a collection of chapters covering some of the latest research and developments in chemical engineering and sustainable technologies. The book is divided into nine chapters that cover a range of topics, including materials for energy storage, environmental sustainability, and green chemistry.

Chapter 1 focuses on materials for fuel cell applications, which is a promising technology for clean energy production. Chapter 2 discusses anti-icing additives for various fuels, which is crucial for safe and efficient fuel transportation in cold climates. Chapter 3 presents the application of monoliths for toluene disproportionation, an important process in the petrochemical industry. Chapter 4 and Chapter 5 discuss the heat and mass transfer through porous media and the effect of surface wettability on two-phase flow. Chapter 6 examines the study of mass and heat transfer through porous medium in the presence of a magnetic field, which has potential applications in the energy and aerospace industries.

Chapter 7 and Chapter 8 discuss different types of membranes which are promising candidates for solid oxide fuel cells and as oxygen separation membranes. Finally, Chapter 9 examines India's readiness for Industry 4.0, which is a global trend towards automation and data exchange in manufacturing technologies.

We hope that this book will serve as a valuable reference for researchers, students, and professionals in the field of chemical engineering and sustainable technologies. The contributions in this book demonstrate the critical role of chemical engineering in achieving sustainable development and highlight some of the key challenges and opportunities in this field. We believe that the topics covered in this book will inspire further research and development in this important area of study.

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Green Solutions
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Preface

The world is facing unprecedented environmental challenges that demand immediate and innovative solutions. Industrial activities have contributed significantly to environmental degradation, and they also have a crucial role in reversing the negative trends. The industries that embrace sustainable practices can reduce their environmental footprint and create a more resilient future.

This book aims to present an overview of some of the latest developments in sustainable industrial practices. The chapters cover diverse topics, such as biogreases for environment-friendly lubrication, the use of biotechnology in the leather industry, chromium remediation in tanning, rainwater harvesting, waste management, water treatment, energy efficiency, and measurement uncertainty in Industry 4.0.

The chapters draw upon the latest research and practical experiences to provide insights into the challenges and opportunities for sustainable industrial practices. The authors offer an interdisciplinary perspective that highlights the need for collaboration among researchers, industry, policymakers, and communities to achieve sustainability goals.

The book's target audience includes researchers, engineers, managers, policymakers, and students who are interested in sustainable industrial practices. The book can be used as a reference for courses on sustainable engineering, environmental science, and industrial ecology.

The editor and authors hope that this book will inspire further research, innovation, and action towards a more sustainable industrial future.

Editor

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(Set of Two Volumes)

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Preface

The field of chemical engineering is constantly evolving, and new technologies and processes are being developed to meet the challenges of a rapidly changing world. As we strive to develop sustainable and efficient solutions, it is important to explore innovative ideas and methods that can help us achieve these goals.

This book aims to provide a comprehensive overview of some of the latest advances in chemical engineering and sustainable technologies as a collection of research papers and case studies. The book begins with a chapter on the numerical analysis of mass transfer in circular micro-channels for slug flow, which provides an overview of the behavior of fluids in micro-channels, an area of increasing interest due to its potential for applications in microfluidics and lab-on-a-chip devices. This is followed by a chapter on monolithic reactors for hydroisomerization of ethylbenzene, which discusses the use of this type of reactor in the production of high-quality fuels and chemicals.

The next chapter focuses on catalysts for biodiesel production, providing insights into the latest developments in the field and highlighting the potential of biodiesel as a sustainable alternative to fossil fuels. The role of chemistry in waste management is then explored, with a chapter dedicated to this topic, discussing the chemical processes involved in the treatment and disposal of waste.

The book also includes a chapter on the study of heat and mass transfer through a channel filled with a porous medium with heated plates and the behavior of an inclined magnetic field. The status and challenges of laser ignition vehicles are discussed in the following chapter, highlighting the potential of this technology in reducing emissions and improving fuel efficiency. Another chapter of the book discusses the potential of municipal solid waste as a source of

energy, exploring various techniques for waste-to-energy conversion. The next chapter is on oxygen permeable inorganic membranes, discussing their potential applications in oxygen separation and other fields.

The book concludes with a chapter on the Corey-Bakshi-Shibata (CBS) catalyst, a chiral catalyst widely used in organic chemistry for enantioselective reductions of ketones and imines. The chapter discusses the synthesis and application of this catalyst in industrial operations..

By examining these topics, we hope to provide readers with a comprehensive understanding of the latest advancements in chemical engineering and sustainable technologies.

We would like to express our gratitude to the authors who contributed their time and expertise to make this book possible. We would also like to thank the readers for their interest in this book and hope that it provides valuable insights and inspires new ideas and approaches in the field of chemical engineering.

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Green Solutions
for
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The chapters draw upon the latest research and practical experiences to provide insights into the challenges and opportunities for sustainable industrial practices. The authors offer an interdisciplinary perspective that highlights the need for collaboration among researchers, industry, policymakers, and communities to achieve sustainability goals.

The book's target audience includes researchers, engineers, managers, policymakers, and students who are interested in sustainable industrial practices. The book can be used as a reference for courses on sustainable engineering, environmental science, and industrial ecology.

The editor and authors hope that this book will inspire further research, innovation, and action towards a more sustainable industrial future.

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