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## **Healable Polymer Systems**

## Fundamentals, Synthesis and Applications

**Barnaby W Greenland** University of Sussex, UK **Wayne Hayes** University of Reading, UK

## Synopsis

Polymers are used in many everyday technologies. Their degradation due to environmental exposure has led to great interest in materials that can heal and repair themselves. To design new self-healing polymers it's important to understand the fundamental healing mechanisms behind the material. This book outlines the key concepts and mechanisms underpinning the design and processing of healable polymers, and indicates potential directions for progress in the future development and applications of these fascinating and potentially valuable materials. Written by leading experts, the book provides polymer scientists with a compact and readily accessible source of reference for healable polymer systems.

## **Brief Contents**

- Healable Polymeric Materials
- Encapsulation-based Self-healing Polymers and Composites
- Reversible Covalent Bond Formation as a Strategy for Healable Polymer Networks
- Supramolecular Healable Materials
- Thermodynamics of Self-healing and their Application in Polymeric Materials

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From Production to Market Edited by Mohammad Aslam, Sanjeev Mishra and Jorge Aburto



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	Volume 89

## **Biorefining of Renewable Diesel**

## From Production to Market

Mohammad Aslam National Institute of Technology Srinagar, India Sanjeev Mishra Sardar Swaran Singh National Institute of Bioenergy, India Jorge Aburto Mexican Petroleum Institute, Mexico

## Synopsis

Renewable diesel is a liquid transportation fuel with lower greenhouse gas emission properties and a more sustainable feedstock than fossil-based diesel, being derived from biomass. It differs from biodiesel in chemical composition, properties and processing route. **Biorefining of Renewable Diesel** begins with an introduction to the need for, and potential of, renewable diesel before looking at processes for 2nd and 3rd generation renewable diesel as well as production from waste feedstocks. It includes discussion of integrating renewable diesel biorefineries with existing petrol refineries, life cycle analysis of renewable diesel biorefineries and a perspective on the future of renewable diesel. This book is a valuable resource for any transportation fuel professionals interested in sustainability solutions.

## **Key Features and Highlights**

- Introduces the need for, and potential of, renewable diesel
- Covers processes for 2nd and 3rd generation renewable diesel as well as production from waste feedstocks
- Discusses how renewable diesel biorefineries can be integrated with existing petrol refineries to encourage the transition to sustainable fuels
- Explores life cycle analysis of renewable diesel biorefineries and the possible future of sustainable fuels

## **Brief Contents**

- Renewable Diesel: A Sustainable Driver for Next Generation
- Biorefining of Renewable Diesel: From Production to Market
- Major Resources for Renewable Diesel Production, Challenges and Opportunities
- Catalytic Systems for Renewable Diesel Production
- Processing Technologies for Renewable Diesel Production
- Hydrodeoxygenation of Triglycerides into Renewable Diesel
- Turning Lignocellulose Biomass into Etheric Biofuel
- Biorefining of Second-generation Liquid Biomass into Renewable Diesel
- Bio-refining of 3-G Algal Biomass into Green Fuels and High Value Products
- Organic Waste as a Feedstock to Produce Renewable Diesel
- High-value Co-products from a Renewable Diesel based Biorefinery Platform
- Blending, Storage, and Distribution of Renewable Diesel: Production to Market
- Renewable Diesel Industry: A Real-world Scenario
- Life Cycle and Techno-economic Assessment of Renewable Diesel and Biorefinery
- Integrating Renewable Diesel Biorefinery with Existing Petroleum Refinery: Scope and Challenges
- Current Status and Future Outlook of Renewable Diesel Biorefinery

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## **Polymers**

Synthesis, Properties and Applications Edited by Aigin Wang and Yongfeng Zhu



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	Volume 42

## **Superabsorbent Polymers**

## Synthesis, Properties and Applications

Aigin Wang Aigin Wang, Chinese Academy of Sciences, China Yongfeng Zhu Yongfeng Zhu, Chinese Academy of Sciences, China

## **Synopsis**

This book introduces in detail the development history, synthesis methods, physicochemical properties and the main applications of SAPs in agriculture, hygiene, construction, environmental management, bioscience and more, based on multiple properties including absorption, flexibility, elasticity, sensitivity, etc.

Edited by experts in the area, the book also highlights the biodegradability, commercial viability and market potential of SAPs and SAP composites, and the feasibility of using biomass as a raw material for SAP production.

## **Brief Contents**

- Superabsorbent Polymers: Classification, Synthetic Methodology, Physicochemical **Properties and Applications**
- Superabsorbent Polymers Based on Natural Polymer
- Superabsorbent Polymers Based on Clays
- From Waste to Superabsorbent Polymers
- Hygienic Superabsorbent Polymers: Personal Health Care Applications and Recycling/Upcycling of Disposable Absorbent Products
- Superabsorbent Polymers for Sustainable Agriculture
- Application of Superabsorbent Polymers in Environment Management
- Application of Superabsorbent Polymers in Construction
- Superabsorbent Polymers for Medical Treatment

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Catalysis Series Volume 49

## **Catalytic Activation of Small Molecules**

Mustafa Yasin Aslan Usak University, Turkey Angela Daisley University of Glasgow, UK Justin S J Hargreaves University of Glasgow, UK José L Rico Universidad Michoacana de San Nicolás de Hidalgo, Mexico

### **Synopsis**

Small molecule activation encompasses various catalytic processes which are currently conducted on the industrial scale, such as steam reforming of methane and ammonia synthesis, and which are of tremendous global importance. In addition to this, there are a number of interesting, and potentially societally transformative, target reactions such as the valorisation of carbon dioxide. Providing a state-of-the-art account of the area of small molecule activation this book brings together the challenges and approaches to catalytic activation of methane, nitrogen, carbon monoxide and carbon dioxide.

## **Key Features and Highlights**

- Provides a state-of-the-art account of the area of small molecule activation
- Brings together some of the challenges and approaches to catalytic activation of methane, nitrogen, carbon monoxide and carbon dioxide
- Discusses a mixture of currently operated industrial processes and highly desirable target reactions using heterogeneous catalysis, electrocatalysis, photocatalysis and chemical looping approaches

### **Brief Contents**

- Steam Reforming and Dry Reforming of Methane
- Methane Cracking: A Comprehensive Review of Catalysts, Solar Reactors and Integrated System Case Studies
- Oxidative Coupling of Methane
- Exploring Chemical Looping for Methane Utilisation
- Catalytic Dehydroaromatisation of Methane
- Activation of CO, CO  $_{\rm 2}$  and H  $_{\rm 2}$  Towards Synthetic Fuel Manufacture by Fischer–Tropsch Synthesis
- Electrocatalytic Carbon Dioxide Activation
- Construction of Active sites for CO<sub>2</sub> Photoreduction
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- Catalytic Combustion of Methane in Low Concentration Gas Streams
- Conclusion

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### Polymers as Corrosion Inhibitors

Principles to Applications Edited by Chandrabhan Verma



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	Volume 43

## **Polymers as Corrosion Inhibitors**

## **Principles to Applications**

**Chandrabhan Verma** King Fahd University of Petroleum and Minerals, Saudi Arabia

### **Synopsis**

This book, edited by a leading expert and including contributions from renowned professionals, is a vital source for applied chemists, corrosion engineers, materials scientists, and university researchers. It fills the gaps between basic ideas and useful applications, offering insightful information to anyone using cutting-edge polymer-based solutions to prevent corrosion.

## **Brief Contents**

- Polymeric Corrosion Inhibitors: Properties, Principles and Advantages over Traditional Organic Inhibitors
- Natural and Synthetic Corrosion Inhibitors: Relative Corrosion Inhibition Potential, Advantages, and Shortcomings
- Corrosion Inhibition Mechanism of Polymers: Effect of Different Parameters and the Nature of the Metal/Electrolyte
- Aqueous Phase Polymeric Surfactants as Corrosion Inhibitors: Behavior and Chemistry of Polymers in Different Corrosion Environments
- Recent Trends of Aqueous Phase Polymers as Corrosion Inhibitors for Various Metals in Harsh Environmental Conditions
- Grafted Biopolymers as Aqueous Corrosion Inhibitors: Safety, Sustainability, and Efficiency
- Grafting of Natural and Synthetic Polymers: An Approach to Improving the Safety, Sustainability, and Efficiency
- Biodegradable Synthetic Polymers as Aqueous Corrosion Inhibitors: Past and Present Advancements and Future Prospects
- Polymer Composites as Corrosion Inhibitors: Past and Present Advancements, Future Prospects and the Concept of Self-healing Coatings
- MXene and MOF-based Polymer Composites as Corrosion Inhibitors: Past and Present Advancements and Future Prospects
- Polymer Surfactants as Corrosion Inhibitors: Past and Present Advancements and Future Prospects
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## Zeolites

### From Fundamentals to Emerging Applications

Edited by David P. Serrano and Jiří Čejka



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## **Zeolites**

## From Fundamentals to Emerging Applications

**David P Serrano** Universidad Rey Juan Carlos, Spain **Jiří Čejka** J. Heyrovský Institute of Physical Chemistry, Czech Republic

## Synopsis

Widely used across many sectors, including oil refining, gas separation,  $CO_2$  capture and environmental remediation, zeolites are among the most important industrial, heterogeneous catalysts. Covering several topics, ranging from structure and synthesis to specific applications, this book provides readers with a solid foundation to further explore these fascinating materials.

## **Key Features and Highlights**

- Introduces both the fundamentals and the applications of zeolites
- Provides readers with a solid foundation to further explore these fascinating materials
- Expands readers' understanding of zeolite chemistry while bringing them up to speed on new discoveries and current trends

## **Brief Contents**

- Zeolites: Historical Evolution and Current Relevance
- Structure of Zeolites: Towards Local Level Understanding
- Natural Zeolites: Crystal-chemistry, Occurrence, Properties and Utilizations
- Cutting-edge Insights into Zeolite Synthesis Mechanisms
- Aluminophosphate Zeotypes: Structural Chemistry and Applications
- Acidity of Zeolites
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- Zeolites in Oil Refining and Petrochemical Industries
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 Series:
 Chemistry in the Environment Volume 16

# Per- and Polyfluoroalkyl Substance Treatment Technologies

Yang Deng Montclair State University, USA Qingguo Huang University of Georgia, USA Sheau-Yun (Dora) Chiang Wood PLC, USA

### Synopsis

Per- and Polyfluoroalkyl Substances (PFAS) are an emerging class of persistent organic pollutants. Their persistence, trace concentrations, prevalence, bioaccumulation, and possible toxicities make PFAS a potential risk for ecological and human health. PFAS Treatment Technologies provides a thorough review of the current state of research in treatment technologies for removing PFAS from the environment. Beginning with an introduction to PFAS challenges and research needs, it covers the established and promising technologies for PFAS removal from drinking water, wastewater, and groundwater.

## **Key Features and Highlights**

- Provides an introduction to the problems of PFAS, including their prevalence and persistence
- Draws together the latest research on established and promising technologies for removing PFAS from the environment
- Includes technologies relevant to drinking water, wastewater and groundwater

### **Brief Contents**

- Introduction: Challenges and Opportunities in Treatment Technologies for PFAS
   Contamination in Water
- PFAS Removal from Impacted Water by Ion Exchange
- Activated Carbon Adsorption of PFAS in Water
- Membrane Processes for the Removal of PFAS from Water
- Thermal Decomposition of Per- and Polyfluoroalkyl Substances: Mechanisms and Implications for Water Purification
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