

Nano Ic Engines

This book comprises select proceedings of the International Conference on Innovations in Mechanical Engineering (ICIME 2021). It presents innovative ideas and new findings in the field of mechanical engineering. Various topics covered in this book are aerospace engineering, automobile engineering, thermal engineering, renewable energy sources, bio-mechanics, fluid mechanics, MEMS, mechatronics, robotics, CAD/CAM, CAE, CFD, design and optimization, tribology, materials engineering and metallurgy, mimics, surface engineering, nanotechnology, polymer science, manufacturing, production management, industrial engineering and rapid prototyping. This book will be useful for the students, researchers and professionals working in the various areas of mechanical engineering.

This thesis investigates the tribological viability of bio-based base stock to which different nanoparticles were incorporated for engine piston-ring-cylinder-liner interaction. It determines experimentally the effects of lubricating oil conditions (new and engine-aged) on the friction and wear of the materials used for piston rings and cylinder liners. The specific base stock examined was a trimethylolpropane (TMP) ester derived from palm oil, and the nanoparticles were used as additives to obtain tribologically enhanced bio-based lubricants. The overall analysis of the results demonstrated the potential of nanoparticles to improve the tribological behavior of bio-based base stock for piston-ring-cylinder-liner interaction.

The book presents high-quality papers from the Third International Conference on Microelectronics, Computing & Communication Systems (MCCS 2018). It discusses the latest technological trends and advances in MEMS and nanoelectronics, wireless communications, optical communication, instrumentation, signal processing, image processing, bioengineering, green energy, hybrid vehicles, environmental science, weather forecasting, cloud computing, renewable energy, RFID, CMOS sensors, actuators, transducers, telemetry systems, embedded systems, and sensor network applications. It includes papers based on original theoretical, practical and experimental simulations, development, applications, measurements, and testing. The applications and solutions discussed in the book provide excellent reference material for future product development.

This book, divided in two volumes, originates from Techno-Societal 2018: the 2nd International Conference on Advanced Technologies for Societal Applications, Maharashtra, India, that brings together faculty members of various engineering colleges to solve Indian regional relevant problems under the guidance of eminent researchers from various reputed organizations. The focus is on technologies that help develop and improve society, in particular on issues such as the betterment of differently abled people, environment impact, livelihood, rural employment, agriculture, healthcare, energy, transport, sanitation, water, education. This conference aims to help innovators to share their best practices or products developed to solve specific local problems which in turn may help the other researchers to take inspiration to solve problems in their region. On the other hand, technologies proposed by expert researchers may find applications in different regions. This offers a multidisciplinary platform for researchers from a broad range of disciplines of Science, Engineering and Technology for reporting innovations at different levels.

Biomedical, Environmental, and Industrial Applications

Applications in Food, Healthcare and Sustainability

Select Proceedings of ICIPDIMS 2019

Biotechnology for Biofuels: A Sustainable Green Energy Solution

Nano-Energetic Materials

Prospects of Alternative Transportation Fuels

New Advances in Vehicular Technology and Automotive Engineering

This book consists of peer-reviewed proceedings from the International Conference on Innovations in Mechanical Engineering (ICIME 2020). The contents cover latest research in all major areas of mechanical engineering, and are broadly divided into five parts: (i) thermal engineering, (ii) design and optimization, (iii) production and industrial engineering, (iv) materials science and metallurgy, and (v) multidisciplinary topics. Different aspects of designing, modeling, manufacturing, optimizing, and processing are discussed in the context of emerging applications. Given the range of topics covered, this book can be useful for students, researchers as well as professionals.

In today's global context, there has been extensive research conducted in reducing harmful emissions to conserve and protect our environment. In the automobile and power generation industries, diesel engines are being utilized due to their high level of performance and fuel economy. However, these engines are producing harmful pollutants that contribute to several global threats including greenhouse gases and ozone layer depletion. Professionals have begun developing techniques to improve the performance and reduce emissions of diesel engines, but significant research is lacking in this area. Recent Technologies for Enhancing Performance and Reducing Emissions in Diesel Engines is a pivotal reference source that provides vital research on technical and environmental enhancements to the emission and combustion characteristics of diesel engines. While highlighting topics such as biodiesel emulsions, nanoparticle additives, and mathematical modeling, this publication explores the potential additives that have been incorporated into the performance of diesel engines in order to positively affect the environment. This book is ideally designed for chemical and electrical engineers, developers, researchers, power generation professionals, mechanical practitioners, scholars, ecologists, scientists, graduate students, and academicians seeking current research on modern innovations in fuel processing and environmental pollution control.

3rd Generation Biofuels: Disruptive Technologies to Enable Commercial Production is a comprehensive volume on all aspects of algal biofuels, offering the latest advances on commercial implementation. In addition to the fundamentals, the book discusses all applied aspects of 3rd generation biofuels production, including design approaches, unit operations of the upstream and downstream biomass

processing, and every potential microalgae-based energy product, including microbial fuel cells. Policy, economic, environmental, and regulatory issues are addressed in a dedicated section. Finally, the book presents pilot and demonstration-scale projects for 3rd generation biofuels production in the format of a white paper. Each chapter reviews the state of the art, discusses the disruptive technological approaches that will potentially enable large-scale production, and concludes with specific recommendations on how to achieve commercial competitiveness. The book provides readers with an invaluable reference for researchers, graduates, and practitioners working in the areas of renewable energy, bioenergy and alternative fuels, and biotechnology. Offers a sequential framework for the design of process plants using 3rd generation feedstock Presents dedicated sections on case studies at pilot and demonstration scales as well as on policy, economic, and environmental issues Provides a global perspective on biofuels production, with more than 40 contributions from world-renounced experts This book discusses different types of alternative fuels, including biodiesel, alcohol, synthetic fuels, compressed natural gas (CNG) and its blend with hydrogen, HCNG, and provides detailed information on the utilization of these alternative fuels in internal combustion (IC) engines. Further, it presents methods for production of these alternative fuels and explores advanced combustion techniques, such as low-temperature and dual-fuel combustion, using alternative fuels. It includes a chapter on the soot morphology of biodiesel, which focuses on the toxicity. There are also four chapters on hydrogen-fueled engines, which discuss use of hydrogen in IC engines and also provide important information on the methodologies. This book is a valuable resource for researchers and practicing engineers alike.

A Textbook of Machine Design

Select Proceedings of NCICEC 2019

Presented at ... Fall Technical Conference of the ASME Internal Combustion Engine Division

Modern Electrochemical Methods in Nano, Surface and Corrosion Science

Extreme Tribology

Biodiesel Fuels Based on Edible and Nonedible Feedstocks, Wastes, and Algae

3rd Generation Biofuels

Nanomaterials: Application in Biofuels and Bioenergy Production Systems looks at how biofuels and bioenergy can be part of the "sustainable" solution to the worlds energy problems. By addressing bioenergy products compared to their fossil energy counterparts, covering research and development in biofuels applied with nanomaterials this book analyzes the future trends and how biofuels and bioenergy can contribute to its optimization. Starting from fundamentals up to synthesis, characterization and applications of nanomaterials in biofuels and bioenergy production systems, the chapters include the procedures needed for introducing nanomaterials in these specific sectors along with the benefits derived from their applications. Including the hazards and environmental effects of nanomaterials in bioenergy applications, sustainability issues and a techno-economic analysis of the topic, this book provides researchers in bioscience, energy & environment and bioengineering

with an up to date look at the full life cycle assessment of nanomaterials in bioenergy. Provides a one stop solution manual for applications of nanomaterials in bioenergy and biofuels Includes biofuel applications with compatible global application case studies Addresses the demand for environmental and techno-economic analysis of nanomaterials applications

Now in its fourth edition, this textbook remains the indispensable text to guide readers through automotive or mechanical engineering, both at university and beyond. Thoroughly updated, clear, comprehensive and well-illustrated, with a wealth of worked examples and problems, its combination of theory and applied practice aids in the understanding of internal combustion engines, from thermodynamics and combustion to fluid mechanics and materials science. This textbook is aimed at third year undergraduate or postgraduate students on mechanical or automotive engineering degrees. New to this Edition: - Fully updated for changes in technology in this fast-moving area - New material on direct injection spark engines, supercharging and renewable fuels - Solutions manual online for lecturers

This ebook is a compilation of 234 papers presented at the 6th Asia International Conference on Tribology (ASIATRIB2018): Kuching, Sarawak - Malaysia from 17 to 20 September 2018.

This multi-disciplinary book presents the most recent advances in exergy, energy, and environmental issues. Volume 1 focuses on fundamentals in the field and covers current problems, future needs, and prospects in the area of energy and environment from researchers worldwide. Based on some selected lectures from the Eleventh International Exergy, Energy and Environmental Symposium (IEEES-11) and complemented by further invited contributions, this comprehensive set of contributions promote the exchange of new ideas and techniques in energy conversion and conservation in order to exchange best practices in "energetic efficiency." Included are fundamental and historical coverage of the green transportation and sustainable mobility sectors, especially regarding the development of sustainable technologies for thermal comforts and green transportation vehicles. Furthermore, contributions on renewable and sustainable energy sources, strategies for energy production, and the carbon-free society constitute an important part of this book.

Proceedings of the ... Fall Technical Conference of the ASME Internal Combustion Engine Division

Select Proceedings of ICIME 2021

Approaches Toward NOx Free Automobiles

Advances in Engine Tribology

Fundamentals and Challenges

Application in Biofuels and Bioenergy Production Systems

Proceedings of the Third International Conference on Microelectronics, Computing and Communication Systems

An automobile was seen as a simple accessory of luxury in the early years of the past century. However, in the present days it's undeniable the amount of technology and human effort applied by the vehicular industry for developing high-quality vehicles, but still, cheap for the common person. In this context, this book tries not only to fill a gap by presenting new and updated subjects related to the vehicular technology and to the automotive engineering but also to provide guidelines for future research. This book is a result of many valuable

contributions from worldwide experts of automotive's field. The amount and type of contributions were judiciously selected to cover as possible the widest range of research. The most recent and cutting?edge subjects can be found in this book, e.g., electronics, mechanics, materials, and manufacturing.

Nanotechnology in the Automotive Industry explores how nanotechnology and nanomaterials are used to enhance the performance of materials and devices for automotive application by fabricating nano-alloys, nanocomposites, nano coatings, nanodevices, nanocatalysts and nanosensors. Consisting of 36 chapters in 6 parts, this new volume in the Micro and Nano Technologies series is for materials scientists, nanotechnologists and automotive engineers working with nanotechnology and nanomaterials for automotive applications. Nanotechnology is seen as one of the core technologies for the future automotive industry to sustain competitiveness. The benefits that nanotechnology brings to the automotive sector include stronger and lighter materials for increased safety and reduced fuel consumption, improved engine performance and fuel consumption for gasoline powered vehicles due to nanocatalysts, fuel additives and lubricants, and more. Discusses various approaches and techniques such as nanoalloys, nanocomposites, nanocoatings, nanodevices, nanocatalysts and nanosensors used in modern vehicles Presents the challenges and future of automotive materials Explores how nanotechnology and nanomaterials are used to enhance the performance of materials and devices for automotive applications

This book comprises select proceedings of the International Conference on Emerging Trends in Mechanical Engineering (ICETME 2018). The book covers various topics of mechanical engineering like computational fluid dynamics, heat transfer, machine dynamics, tribology, and composite materials. In addition, relevant studies in the allied fields of manufacturing, industrial and production engineering are also covered. The applications of latest tools and techniques in the context of mechanical engineering problems are discussed in this book. The contents of this book will be useful for students, researchers as well as industry professionals.

This book gathers selected research articles from the International Conference on Innovative Product Design and Intelligent Manufacturing System (ICIPDIMS 2019), held at the National Institute of Technology, Rourkela, India. The book discusses latest methods and advanced tools from different areas of design and manufacturing technology. The main topics covered include design methodologies, industry 4.0, smart manufacturing, and advances in robotics among others. The contents of this book are useful for academics as well as professionals working in industrial design, mechatronics, robotics, and automation.

Tribological Study of Nanoparticles Enriched Bio-based Lubricants for Piston Ring–Cylinder Interaction

***Emerging Trends of Nanotechnology in Environment and Sustainability
Nano- and Biocatalysts for Biodiesel Production
NOx Emission Control Technologies in Stationary and Automotive Internal Combustion Engines
Nanomaterials
Proceedings of the 13th Italian Conference : Roma, Italy, 19-21 February 2008
Sensors and Microsystems***

This book provides a complete overview of a wide range of nanomaterials from their synthesis and characterization to current and potential applications with special focus on the use of such nano-based products as functional agents in biomedical, environmental and industrial applications. It addresses the intrinsic relationship between aspects involving the synthesis of nanocompounds, their bio-physico-chemical properties and their interactions occurring in biomedical, environmental and industrial matrix. This book is of interest to engineers, academics and research scholars working in these fields.

This book discusses the unique interactions of nanoparticles with various biomolecules under different environmental conditions. It describes the consequences of these interactions on other biological aspects like flora and fauna of the niche, cell proliferation, etc. The book provides information about the novel and eco-friendly nanoparticle synthesis methods, such as continuous synthesis of nanoparticles using microbial cells. Additionally, the book discusses nanoparticles' potential impact in different areas of biological sciences like food, medicine, agriculture, and the environment. Due to their advanced physicochemical properties, nanoparticles have revolutionized biomedical and pharmaceutical sciences. Inside the biological milieu, nanoparticles interact with different moieties to adopt stable shape, size, and surface functionalities and form nano-biomolecular complexes. The interaction pattern at the interface form complexes determines the fate of interacting biomolecules and nanoparticles inside the biological system. Understanding the interaction pattern at the nano-bio interface is crucial for the safe use of nanoparticles in natural sciences. This book rightly addresses all questions about the interaction and the ensuing structure and function of these nano-biomolecular complexes. This book caters to students and researchers in the area of biotechnology, microbiology, and pharmaceutical sciences.

Reviews recent advances in catalytic biodiesel synthesis, highlighting various nanocatalysts and nano(bio)catalysts developed for effective biodiesel production Nano- and Biocatalysts for Biodiesel Production delivers an essential reference for academic and industrial researchers in biomass valorization and biofuel industries. The book covers both nanocatalysts and biocatalysts, bridging the gap between homogenous and heterogenous catalysis. Readers will learn about the techno-economical and environmental aspects of biodiesel production using different feedstocks and catalysts. They will also

discover how nano(bio)catalysts can be used as effective alternatives to conventional catalysts in biodiesel production due to their unique properties, including reusability, high activation energy and rate of reaction, easy recovery, and recyclability. Readers will benefit from the inclusion of: Introductions to CaO nanocatalysts, zeolite nanocatalysts, titanium dioxide-based nanocatalysts and zinc-based in biodiesel production An exploration of carbon-based heterogeneous nanocatalysts for the production of biodiesel Practical discussions of bio-based nano catalysts for biodiesel production and the application of nanoporous materials as heterogeneous catalysts for biodiesel production An analysis of the techno-economical considerations of biodiesel production using different feedstocks Nano- and Biocatalysts for Biodiesel Production focuses on recent advances in the field and offers a complete and informative guide for academic researchers and industrial scientists working in the fields of biofuels and bioenergy, catalysis, biotechnology, bioengineering, nanotechnology, and materials science. The depletion of petroleum-derived fuel and environmental concerns have prompted many millennials to consider biofuels as alternative fuel sources. But completely replacing petroleum-derived fuels with biofuels is currently impossible in terms of production capacity and engine compatibility. Nevertheless, the marginal replacement of diesel with biofuel could delay the depletion of petroleum resources and abate the radical climate change caused by automotive pollutants. Energy security and climate change are the two major driving forces for worldwide biofuel development, and also have the potential to stimulate the agro-industry. The development of biofuels as alternative and renewable sources of energy has become critical in national efforts towards maximum self-reliance, the cornerstone of our energy security strategy. At the same time, the production of biofuels from various types of biomass such as plants, microbes, algae and fungi is now an ecologically viable and sustainable option. This book describes the biotechnological advances in biofuel production from various sources, while also providing essential information on the genetic improvement of biofuel sources at both the conventional and genomic level. These innovations and the corresponding methodologies are explained in detail.

Mechanical and Tribology Aspects

Recent Trends in Mechanical Engineering

Techno-Societal 2018

Myths, Realities and Opportunities

Select Proceedings of ICIME 2020

Proceedings of Asia International Conference on Tribology 2018

Nanotechnology in the Automotive Industry

This book collects a number of papers presented at the 13th Italian Conference on Sensors and Microsystems. It provides a unique perspective on the research and development of sensors, microsystems and related technologies in Italy. Besides the

scientific value of the papers, this book offers a unique source of data to analysts that intend to survey the Italian situation on sensors and microsystems.

Tribology is usually defined as "the science and technology of interacting surfaces in relative motion". It includes the research and application of principles of friction, wear, lubrication and design. Green tribology involves tribological aspects of environmental and biological impacts. This multidisciplinary field of science and technology is very important for the development of new products in mechanics, materials, chemistry, life sciences and by extension for all modern industry. The current volume aims to provide recent information on progress in green tribology. Chapter 1 provides information on tribological materials (an eco-sustainable perspective), while chapter 2 is dedicated to preparation and tribology performance of bio-based ceramic particles from rice waste and chapter 3 describes tribological behavior and tribochemistry of Ti_3SiC_2 in water and alcohols. Chapter 4 contains information on modelling and analysis of the oil-film pressure of a hydrodynamic journal bearing lubricated by nano based bio-lubricants using a D-optimal design. Finally, chapter 5 is dedicated to wear performance of oil palm seed fibre reinforced polyester composite aged in brake fluid solutions. The current volume can be used as a research book for final undergraduate in engineering courses or as a topic on green tribology at postgraduate level. This book can also serve as useful reference for academics, researchers, mechanical, materials, environmental and manufacturing engineers, professionals green tribology and related industries.

The present multicolor edition has been thoroughly revised and brought up-to-date. Multicolor pictures have been added to enhance the content value and to give the students an idea of what he will be dealing in reality, and to bridge the gap between theory and practice. This book has already been included in the 'suggested reading' for the A.M.I.E. (India) examinations.

This contributed volume aims to provide latest updates in the area of bioenergy including biodiesel, bioethanol, biomethanation, biomass gasification, and biomass cook-stove. The proceedings of ICRA BR 2015 include cutting edge research vital to R&D organizations, academics, and the industry to promote and document the recent developments in the area of bioenergy for all types of stakeholders. The volume highlights the needs of biofuels and their market, the barriers and challenges faced by biofuels and bioenergy and future strategies required to foster new ideas for research, collaboration and commercialization of bioenergy. The major themes of this contributed volume are: Biomass and Energy Management ; Thermochemical Conversion Processes; Biochemical Conversion Processes; Catalytic Conversion Processes; Electrochemical Processes; Waste Treatment to Harvest Energy; and Integrated Processes. The contents of the volume will appeal to students, researchers, professionals, and policymakers in the field of biofuels and bioenergy.

Select Proceedings of ICETME 2018

Innovations in Mechanical Engineering

Select Proceedings of ICAMME 2021

Science, Technology, Health, and Environment

Nanomaterials and Nanotechnology

Composite and Composite Coatings

Introduction to Internal Combustion Engines

The basics and principles of new electrochemical methods and also their usage for fabrication and analysis of different nanostructures were discussed in this book. These methods consist of electrochemical methods in nanoscale (e.g. electrochemical atomic force microscopy and electrochemical scanning tunneling microscopy) and also electrochemical methods for fabrication of nanomaterials.

Since the publication of the Second Edition in 2001, there have been considerable advances and developments in the field of internal combustion engines. These include the increased importance of biofuels, new internal combustion processes, more stringent emissions requirements and characterization, and more detailed engine performance modeling, instrumentation, and control. There have also been changes in the instructional methodologies used in the applied thermal sciences that require inclusion in a new edition. These methodologies suggest that an increased focus on applications, examples, problem-based learning, and computation will have a positive effect on learning of the material, both at the novice student, and practicing engineer level. This Third Edition mirrors its predecessor with additional tables, illustrations, photographs, examples, and problems/solutions. All of the software is 'open source', so that readers can see how the computations are performed. In addition to additional java applets, there is companion Matlab code, which has become a default computational tool in most mechanical engineering programs.

NOx Emission Control Technologies in Stationary and Automotive Internal Combustion Engines: Approaches Toward NOx Free Automobiles presents the fundamental theory of emission formation, particularly the oxides of nitrogen (NOx) and its chemical reactions and control techniques. The book provides a simplified framework for technical literature on NOx reduction strategies in IC engines, highlighting thermodynamics, combustion science, automotive emissions and environmental pollution control. Sections cover the toxicity and roots of emissions for both SI and CI engines and the formation of various emissions such as CO, SO₂, HC, NOx, soot, and PM from internal combustion engines, along with various methods of NOx formation. Topics cover the combustion process, engine design parameters, and the application of exhaust gas recirculation for NOx reduction, making this book ideal for researchers and students in automotive, mechanical, mechatronics and chemical engineering students working in the field of emission control techniques.

Covers advanced and recent technologies and emerging new trends in NOx reduction for emission control Highlights the effects of exhaust gas recirculation (EGR) on engine performance parameters Discusses emission norms such as EURO VI and Bharat stage VI in reducing global air pollution due to engine emissions

This book comprises select peer-reviewed proceedings of the 26th National Conference on IC Engines and Combustion

(NCICEC) 2019 which was organised by the Department of Mechanical Engineering, National Institute of Technology Kurukshetra under the aegis of The Combustion Institute-Indian Section (CIIS). The book covers latest research and developments in the areas of combustion and propulsion, exhaust emissions, gas turbines, hybrid vehicles, IC engines, and alternative fuels. The contents include theoretical and numerical tools applied to a wide range of combustion problems, and also discusses their applications. This book can be a good reference for engineers, educators and researchers working in the area of IC engines and combustion.

**Proceedings of the 2nd International Conference on Advanced Technologies for Societal Applications - Volume 1
Internal Combustion Engines**

Greener and Scalable E-fuels for Decarbonization of Transport

Advances in IC Engines and Combustion Technology

MCCS 2018

Emerging Trends in Mechanical Engineering

Innovation and IPRs in China and India

Applications of composite materials and composite coatings have been increasing in the field of automobile and aerospace industries due to the versatility in their properties. Present book comprehensively reviews the composite materials and coatings with a focus on the mechanical and tribology applications. It covers type of fibres (natural and synthetic), reinforcements and their selection, matrix, and technologies used to produce composite materials. Various sections cover basics and associated failures of composites, strengthening mechanisms and background theories, composite manufacturing technologies, mechanical and tribology properties of past and currently used composites. Features:- Covers different types of fibers, reinforcements, matrix, and technologies used to produce composite materials. Details the tribology behavior of different novel composite coatings fabricated using different coating techniques. Reviews research on wear behavior of composite materials and coatings. Discusses reinforcement behavior with respect to the different processing routes. Illustrates rule of mixtures, failures, theories behind the strengthening mechanism. This book aims at professionals, graduate students and researchers in mechanical engineering, design engineering, composite materials, composite coatings, tribology, automobile, and aircraft.

This second volume of the Handbook of Biodiesel and Petrodiesel Fuels presents a representative sample of the population papers in the field of feedstock-specific biodiesel fuels. The research on feedstocks for biodiesel fuels has first focused on the edible oils as first-generation biodiesel fuels. However, the public concerns about the competition with foods based on these feedstocks and adverse impact on the ecological diversity and

deforestation have resulted in the exploration of nonedible-oil-based biodiesel fuels as second-generation biodiesel fuels in the first instance. Due to the ecological and cost benefits of treating wastes, waste oil-based biodiesel fuels as third-generation biodiesel fuels have emerged. Furthermore, following a series of influential review papers, the research has focused on the algal oil-based biodiesel fuels in recent years. Since the cost of feedstocks in general constitutes 85% of the total biodiesel production costs, the research focused more on improving biomass and lipid productivity in these research fields. Furthermore, since water, CO₂, and nutrients (primarily N and P) have been major ingredients for the algal biomass and lipid production, the research has also intensified in the use of wastewaters and flue gases for algal biomass production to reduce the ecological burdens and the production costs. Part 1 presents a representative sample of the population papers in the field of edible oil-based biodiesel fuels covering major research fronts. It covers soybean oil-based biodiesel fuels, palm oil-based biodiesel fuels, and rapeseed oil-based biodiesel fuels as case studies besides an overview paper. Part 2 presents a representative sample of the population papers in the field of nonedible oil-based biodiesel fuels covering major research fronts. It covers *Jatropha* oil-based biodiesel fuels, polanga oil-based biodiesel fuels, and moringa oil-based biodiesel fuels as case studies besides an overview paper. Part 3 presents a representative sample of the population papers in the field of waste oil-based biodiesel fuels covering major research fronts. It covers wastewater sludge-based biodiesel fuels, waste cooking oil-based biodiesel fuels, and microbial oil-based biodiesel fuels as case studies besides an overview paper. Part 4 presents a representative sample of the population papers in the field of algal oil-based biodiesel fuels covering major research fronts. It covers algal biomass production in general, algal biomass production in wastewaters, algal lipid production, hydrothermal liquefaction of algal biomass, algal lipid extraction, and algal biodiesel production besides an overview paper. This book will be useful to academics and professionals in the fields of Energy Fuels, Chemical Engineering, Physical Chemistry, Biotechnology and Applied Microbiology, Environmental Sciences, and Thermodynamics. Ozcan Konur is both a materials scientist and social scientist by training. He has published around 200 journal papers, book chapters, and conference papers. He has focused on the bioenergy and biofuels in recent years. In 2018, he edited 'Bioenergy and Biofuels', that brought together the work of over 30 experts in their respective field. He also edited 'Handbook of Algal Science, Technology, and Medicine' with a strong section on the algal biofuels in 2020.

In the present book, nanofluid heat and mass transfer in engineering problems are investigated. The use of additives in the base fluid like water or ethylene glycol is one of the techniques applied to augment heat transfer.

Newly, innovative nanometer-sized particles have been dispersed in the base fluid in heat transfer fluids. The fluids containing the solid nanometer-sized particle dispersion are called "nanofluids." At first, nanofluid heat and mass transfer over a stretching sheet are provided with various boundary conditions. Problems faced for simulating nanofluids are reported. Also, thermophysical properties of various nanofluids are presented. Nanofluid flow and heat transfer in the presence of magnetic field are investigated. Furthermore, applications for electrical and biomedical engineering are provided. Besides, applications of nanofluid in internal combustion engine are provided.

This book discusses nanotechnology, its benefits and risks affecting the environment we live in today, and is divided into three parts: Part-I dealing with Sustainability, Part-II describing Toxicological Impacts, and Part-III discussing Nanomaterial-based Adsorbents. The crucial challenge of sustainability in various environmental elements is a global problem. This draws upon various issues of nanotechnology which impact sustainability of food, clean environment, green house gases, raw materials extraction, manufacturing and automobile industry. Growth in the production of nanomaterials to suit any of these applications is commendable. However, this does not negate the growth in their toxic effects. The nanotoxicity research in areas like medicine and agriculture industry is reviewed in detail in this book. Part-II discusses the toxic nature of widely used nanomaterials. Nanomaterials are enormously used in environmental remediation due to some of their distinct properties. These properties are described and discussed. Part-III of the book highlights the highly reactive and adsorbent properties of nanomaterials that enable them to be a competent agent in water and pollutant remediation. This book is mainly intended for researchers and students to acquire fairly comprehensive understanding and appreciation of nanotechnology dominance in sustainability challenges, with the aim to give the anticipatory governance of nanomaterials in our society and environment.

Green and Conventional Techniques

Disruptive Technologies to Enable Commercial Production

Innovative Product Design and Intelligent Manufacturing Systems

Applied Thermosciences

Green Nanotechnology for Biofuel Production

Proceedings of the First International Conference on Recent Advances in Bioenergy Research

Bio-Nano Interface

This book (Vol. I) presents select proceedings of the conference on "Advancement in

Materials, Manufacturing, and Energy Engineering (ICAMME 2021).” It discusses the latest materials, manufacturing processes, evaluation of materials properties for the application in automotive, aerospace, marine, locomotive, and energy sectors. The topics covered include advanced metal forming, bending, welding and casting techniques, recycling and re-manufacturing of materials and components, materials processing, characterization and applications, materials, composites and polymer manufacturing, powder metallurgy and ceramic forming, numerical modeling and simulation, advanced machining processes, functionally graded materials, non-destructive examination, optimization techniques, engineering materials, heat treatment, material testing, MEMS integration, energy materials, bio-materials, metamaterials, metallography, nanomaterial, SMART materials, bioenergy, fuel cell, and superalloys. The book will be useful for students, researchers, and professionals interested in interdisciplinary topics in the areas of materials, manufacturing, and energy sectors.

This book focuses on the use of nanotechnology and nanomaterials in the production of biofuels. It describes the current production technologies for different biofuels and their limitations for commercialization, and discusses in detail how nanomaterials could reduce biofuel production costs. After an introduction to biofuels, the book examines biofuels economics and policy; biofuel production processes – advances and limitations; nanotechnology and its energy applications; nanotechnology in biohydrogen production – for cellulases, in algal fuel, and in bioethanol/biobutanol and biodiesel production. It is a valuable resource for researchers and engineers.

This book examines the two most populous nations on earth – India and China – in an effort to demystify the interaction between intellectual property rights (IPR) regimes, innovation and economic growth by critically looking at the economic and legal realities. In addition, it analyzes the question of how innovation can best be transformed into IPR, and how IPR can best be exploited to encourage innovation. Comparing and contrasting these two giant nations can be highly beneficial as China and India were the two fastest-growing economies in the last three decades, and together their populations make up one third of the world’s total population; as such, exploring how to sustain their growth via

innovation and commercialization of IPR could have a tremendous positive impact on global well-being. While a study of these two mega countries with such diverse dimensions and magnitudes can never be truly comprehensive, this joint effort by scholars from law, business management and economics disciplines that pursues an empirical approach makes a valuable contribution. Divided into three parts, the first offers an in-depth doctrinal and empirical analysis. The second part exclusively focuses on India, while the last is dedicated to China.

Tribology is an unfamiliar term for many, but is experienced by all. It is the science of friction, wear and lubrication of contacting surfaces in relative motion. The aim of this book is to introduce the fundamentals of tribology as well as its challenges in extreme operating conditions. The book comprises a historical background and an introduction to familiarize both undergraduate and postgraduate readers with such an important topic. It addresses a comprehensive coverage of classical tribology of solid contacts, friction mechanics, wear mechanisms and lubrication technologies. The tribology of polymer composites, MEMS and NEMS are explored. In addition, tribology of automotive components is presented, as are tribological applications in many practical situations. Various test methods used in evaluating wear are reviewed. Diverse techniques applied in predicting wear behavior by mathematical models, FE modeling and ANN approach are discussed. The book reviews key features of extraordinary conditions associated with, but not limited to, harsh environments, severe sliding and poor lubrication challenges. A basic understanding of failure modes in tribological systems is covered. The state-of-the-art research on tribology under these extreme conditions is extensively discussed, which will be of interest to researchers. The book highlights solutions for extreme tribology problems and provides an overview of various factors affecting tribosystems in harsh conditions.

Progress in Green Tribology

Nanofluid Heat and Mass Transfer in Engineering Problems

Energy and Exergy for Sustainable and Clean Environment, Volume 1

A Review-Based Approach

***Recent Technologies for Enhancing Performance and Reducing Emissions in Diesel Engines
Advancement in Materials, Manufacturing and Energy Engineering, Vol. I***

This book presents the latest research on the area of nano-energetic materials, their synthesis, fabrication, patterning, application and integration with various MEMS systems and platforms. Keeping in mind the applications for this field in aerospace and defense sectors, the articles in this volume contain contributions by leading researchers in the field, who discuss the current challenges and future perspectives. This volume will be of use to researchers working on various applications of high-energy research.