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Designing and Building Fuel Cells

2007-05-22

acquire an all in one toolkit for expertly designing modeling and constructing high performance fuel cells designing and building fuel cells equips you with a hands on guide for the design modeling and construction of fuel cells that perform as well or better than some of the best fuel cells on the market today filled with over 120 illustrations and schematics of fuel cells and components this one stop guide covers fuel cell applications fuels and the hydrogen economy fuel cell chemistry thermodynamics and electrochemistry fuel cell modeling materials and system design fuel types delivery and processing fuel cell operating conditions fuel cell characterization and much more authoritative and practical designing and building fuel cells features complete information on stack design the latest fuel cell modeling techniques guidance on cutting edge materials and components expert accounts of fuel cell types processing and optimization a step by step example for constructing a fuel cell inside this state of the art fuel cell sourcebook introduction fuel cell applications fuel cells and the hydrogen economy basic fuel cell chemistry and thermodynamics fuel cell electrochemistry fuel cell charge transport fuel cell mass transport fuel cell heat transport fuel cell modeling fuel cell materials fuel cell stack components and materials fuel cell stack design fuel cell system design fuel types delivery and processing fuel cell operating conditions fuel cell characterization

Build Your Own Fuel Cells

2003

fuel cell systems have the potential to revolutionize the way power is generated in the 21st century much like the internal combustion engine did in the last century for building applications fuel cell systems offer modularity high efficiency across a wide range of load conditions minimal environmental impact and opportunities for integration into cogeneration systems this book discusses the different types characteristics and potential applications of fuel cells and fuel cell systems in depth it also provides valuable information on cogeneration systems in buildings as well as on fuel cell subsystems and fuel cell system design cogeneration systems in buildings are thoroughly reviewed as are application requirements for office buildings hotels and motels restaurants and grocery stores health care facilities schools and factories this book is essential to any building designer or contractor that demands in depth authoritative information about the very latest emerging technologies in hvac r ashrae research project 1058

Fuel Cells for Building Applications

2002

learn how to construct and operate the components of a solar hydrogen fuel cell system the fuel cell stack the electrolyzer to generate hydrogen fuel simple hydrogen storage and solar panels designed specifically to run electrolyzers for hydrogen production complete clear illustrated instructions to build all the major components make it easy for the non engineer to understand and work with this important new technology from publisher description

Build a Solar Hydrogen Fuel Cell System

2004

the second edition of pem fuel cell modeling and simulation provides design engineers and researchers with a valuable and completely updated tool for understanding and overcoming barriers to designing and building fuel cells and fuel cell systems starting from the basic concept of a fuel cell this book presents tools for creating new designs and optimizing their performance it provides information on how to test components and verify designs in the development phase saving both time and money also included are design and modelling tips for fuel cell components such as exchange structure catalyst layers gas diffusion and fuel distribution structures as well as for fuel cell stacks and fuel cell plants matlab and femlab codes for polymer electrolyte direct methanol and solid oxide fuel cells are made available covering types for one two and three dimensional modeling and two phase flow phenomena and microfluidics chapters have been updated and or expanded in this new edition new sections have been added to bring more details on topics like degradation in the proton exchange membrane and the catalyst layer effect of compression of the gas diffusion layer hydrogen and oxygen crossover modeling transient behavior modeling fuel cell modeling assumptions and limitations fuel cell systems design for vehicles and buildings it is an indispensable reference for all those involved in fuel cell modeling especially engineers involved in planning and simulating fuel cell systems or fuel cell integration into energy systems energy researchers interested in modeling all aspects of fuel cells from individual components to entire systems and graduate students entering this field this new edition has been updated to include the most current knowledge in the field and its content has been expanded to cover several new topics such as degradation in the proton exchange membrane and the catalyst layer effect of compression of the gas diffusion layer hydrogen and oxygen crossover modeling transient behavior modeling fuel cell modeling assumptions and limitations fuel cell systems design for vehicles and buildings includes matlab and femlab modelling codes applicable for polymer electrolyte direct methanol and solid oxide fuel cells translates basic phenomena into mathematical equations

PEM Fuel Cell Modelling and Simulation using MATLAB

2018-01-01

the only book available on fuel cell modeling and control with distributed power generation applications the emerging fuel cell fc technology is growing rapidly in its applications from small scale portable electronics to large scale power generation this book gives students engineers and scientists a solid understanding of the fc dynamic modeling and controller design to adapt fcs to particular applications in distributed power generation the book begins with a fascinating introduction to the subject including a brief history of the u s electric utility formation and restructuring next it provides coverage of power deregulation and distributed generation dg dg types fuel cell dgs and the hydrogen economy building on that foundation it covers principle operations of fuel cells dynamic modeling and simulation of pem and solid oxide fuel cells principle operations and modeling of electrolyzers power electronic interfacing circuits for fuel cell applications control of grid connected and stand alone fuel cell power generation systems hybrid fuel cell based energy system case studies present challenges and the future of fuel cells matlab simulink based models and their applications are available via a companion site modeling and control of fuel cells is an excellent reference book for students and professionals in electrical chemical and mechanical engineering and scientists working in the fc area

Modeling and Control of Fuel Cells

2009-03-11

although the basic concept of a fuel cell is quite simple creating new designs and optimizing their performance takes serious work and a mastery of several technical areas pem fuel cell modeling and simulation using matlab provides design engineers and researchers with a valuable tool for understanding and overcoming barriers to designing and building the next generation of pem fuel cells with this book engineers can test components and verify designs in the development phase saving both time and money easy to read and understand this book provides design and modelling tips for fuel cell components such as modelling proton exchange structure catalyst layers gas diffusion fuel distribution structures fuel cell stacks and fuel cell plant this book includes design advice and matlab and femlab codes for fuel cell types such as polymer electrolyte direct methanol and solid oxide fuel cells this book also includes types for one two and three dimensional modeling and two phase flow phenomena and microfluidics modeling and design validation techniques covers most types of fuel cell including sofc matlab and femlab modelling codes translates basic phenomena into mathematical equations

PEM Fuel Cell Modeling and Simulation Using Matlab

2011-08-29

fuel your evil urges while you build green energy projects go green as you amass power fuel cell projects for the evil genius broadens your knowledge of this important rapidly developing technology and shows you how to build practical environmentally conscious projects using the three most popular and widely accessible fuel cells in fuel cell projects for the evil genius high tech guru gavin harper gives you everything you need to conduct practical experiments and build energizing fuel cell projects you ll find complete easy to follow plans that feature clear diagrams and schematics as well as instructions for fascinating sustainable energy projects complete with 180 how to illustrations explanations of how fuel cells work and why the hydrogen economy will impact our lives in the near future frustration factor removal all the needed parts are listed along with sources science fair project ideas that are on the cutting edge of the latest technological developments fuel cell projects for the evil genius gives you complete plans instructions parts lists and sources to understand how hydrogen could meet our energy needs in a post carbon economy build a fuel cell car to race against your friends build an intelligent fuel cell car which autonomously drives build a simple fuel cell using adhesive bandages hydrogen fuel your ipod have a hydrogen barbecue cook your food with zero carbon emissions discover how the amounts of hydrogen supplied to fuel cells affect the amounts of electricity produced and much more

Fuel Cell Projects for the Evil Genius

2007-10-22

obtain fuel cell power in your classroom lab garage or in the palm of your hand this sourcebook will guide you into the world of fuel cell technology easily construct fuel cells and generate hydrogen in the brilliant mind fuel cell experiments for a bright future colleen spiegel an internationally recognized fuel cell expert and author provides detailed information about constructing building and experimenting with hydrogen and fuel cell technology the fuel cell stack projects described in this sourcebook will rival the performance of many commerical fuel cells on the market today packed with over 150 schematics of hydrogen and fuel cell projects this guide covers fuel cell mea construction hydrogen fuel generation fuel cell stack design and much more with complete and easy to follow diagrams the brilliant mind fuel cell experiments for a bright future offers building fuel cell stacks using alternative materials such as foil and wire creating new fuel cell technologies based upon simple materials discovering the secrets to building meas generating hydrogen using a solar based electrolyzer learning unconventional methods of producing hydrogen and much more inside this brilliant fuel cell sourcebookintroduction creating hydrogen using solar panels generating hydrogen using chemicals constructing membrane electrode assemblies making a microbial fuel cell building a foil fuel cell crafting a wire based fuel cell creating a planar fuel cell stackabout the authorcolleen s spiegel is the founder of clean fuel cell energy llc and a chemical engineer with a background in the chemical and electronics industry mrs spiegel has been

an r d manager and chemical engineer for more than 8 years and has been an engineering consultant in the areas of design and modeling she has worked in both research and process development and was instrumental in establishing new ideas for several companies she also is the author of designing and building fuel cells mcgraw hill 2007 and pem fuel cell modeling and simulation using matlab elsevier science 2008

Fuel Cell Technology

2003

fuel cells are according to some the answer to the future problems of energy resources rather than solve those problems alone they will doubtless form part of a growing group of alternative energy sources such as wind tidal photovoltaic and nuclear sources which will reduce our dependence on oil stationary fuel cells are the kind used mainly for home office and large scale power plants for those seeking a current overview of stationary fuel cells their status and applications market developments market players economics and future potential this is where to look not a purely engineering textbook it is designed to provide potential adopters of fuel cells with the information needed to make sensible decisions and as such it is unique expert summary of current and future status decision making aid for non engineers increasingly important fuel source

The Brilliant Mind

2008-09

the hydrogen car has been proposed as the solution to our oil problems but how would it work and what potential problems associated with it this book addresses these questions and provides specifics about current developments toward a hydrogen based energy infrastructure it offers the reader an informed look at the current state of fuel cell power and transportation technology and where it s headed

Stationary Fuel Cells: An Overview

2010-07-07

unconventional energy sources have gained and will continue to gain an increasing share of energy systems around the world today hydrogen is recognized as a non polluting energy carrier because it does not contribute to global warming if it is produced from renewable sources hydrogen is already part of today s chemical industry but as an energy source its rare advantages can only be obtained with

the help of technologies currently the fuel cell is considered the cleanest sustainable energy with the development of fuel cells hydrogen based energy generation becomes a reality hydrogen fuel cell technology for stationary applications is an essential publication that focuses on the advantages of hydrogen as a primary energy center and addresses its use in the sustainable future of stationary applications while highlighting a broad range of topics including cost expectations production methods and social impact this publication explores all aspects of the implementation and dissemination of fuel cell technology in the hope of establishing a sustainable marketplace for it this book is ideally designed for fuel cell manufacturers architects electrical engineers civil engineers environmental engineers advocates manufacturers mechanics researchers academicians and students

Hydrogen & Fuel Cells

2020-12-17

fuel cells are electrochemical energy conversion devices that convert hydrogen and oxygen into water producing electricity and heat in the process and providing fuel efficiency and reductions in pollutants demand for this technology is growing rapidly fuel cells are being commercialized for stationary and portable electricity generation and as a replacement for internal combustion engines in automobiles proton exchange membrane pem fuel cells in particular are experiencing an upsurge they have high power density and can vary their output quickly to meet shifts in power demand until now there has been little written about this important technology this book lays the groundwork for fuel cell engineers technicians and students it covers the fundamental aspects of fuel cell design electrochemistry of the technology heat and mass transport system design and applications to bring this technology to professionals at all levels comprehensive guide for engineers researchers and policymakers covers theory and practice of pem fuel cells contains hundreds of original illustrations and real life engineering examples

Hydrogen Fuel Cell Technology for Stationary Applications

2021-04-30

fuel cells continue to be heralded as the energy source of the future and every year an immense amount of research time and money is devoted making them more economically and technically viable fuel cells compendium brings together an up to date review of the literature and commentary surrounding fuel cells research covering all relevant disciplines from science to engineering to policy it is an exceptional resource for anyone with an invested interest in the field provides an comprehensive selection of reviews and other industrially focused material on fuel cells research broadly scoped to encompass many disciplines from science to engineering to applications and policy in depth coverage of the two major types of fuel cells ceramic solid oxide and polymers proton exchange membranes

Development of an Energy Consumption and Cost Data Base for Fuel Cell Total Energy Systems and Conventional Building Energy Systems

1980

a comprehensive guide to the modelling and design of solid oxide fuel cell hybrid power plants this book explores all technical aspects of solid oxide fuel cell sofc hybrid systems and proposes solutions to a range of technical problems that can arise from component integration following a general introduction to the state of the art in sofc hybrid systems the authors focus on fuel cell technology including the components required to operate with standard fuels micro gas turbine mgt technology for hybrid systems is discussed with special attention given to issues related to the coupling of sofcs with mgts throughout the book emphasis is placed on dynamic issues including control systems used to avoid risk conditions with an eye to mitigating the high costs and risks incurred with the building and use of prototype hybrid systems the authors demonstrate a proven economically feasible approach to obtaining important experimental results using simplified plants that simulate both generic and detailed system level behaviour using emulators computational models and experimental plants are developed to support the analysis of sofc hybrid systems including models appropriate for design development and performance analysis at both component and system levels presents models for a range of size units technology variations unit coupling dynamics and start up and shutdown behaviours focuses on sofcs integration with mgts in light of key constraints and risk avoidance issues under steady state conditions and during transient operations identifies interaction and coupling problems within the gt sofc environment including exergy analysis and optimization demonstrates an economical approach to obtaining important experimental results while avoiding high cost components and risk conditions presents analytical computational and experimental tools for the efficient design and development of hardware and software systems hybrid systems based on solid oxide fuel cells modelling and design is a valuable resource for researchers and practicing engineers involved in fuel cell fundamentals design and development it is also an excellent reference for academic researchers and advanced level students exploring fuel cell technology

PEM Fuel Cells

2005-06-21

it sounds so simple just combine oxygen and hydrogen in an electrochemical reaction that produces water and electricity and you ll have a clean efficient power source but scientists have spent decades and billions of dollars in government and industry funding developing the fuel cell there have been successes and serendipitous discoveries along the way but engineering a fuel cell that is both durable and affordable has proved extraordinarily difficult overpotential charts the twists and turns in the ongoing quest to create the perfect fuel cell by exploring the gap between the theory and practice of fuel cell

power matthew n eisler opens a window into broader issues in the history of science technology and society after the second world war including the sociology of laboratory life the relationship between academe industry and government in developing advanced technologies the role of technology in environmental and pollution politics and the rise of utopian discourse in science and engineering

Fuel Cells Compendium

2005-11-24

how hydrogen nonpolluting and easy to produce could become the fuel of the future hydrogen is the quintessential eco fuel this invisible tasteless gas is the most abundant element in the universe it is the basic building block and fuel of stars and an essential raw material in innumerable biological and chemical processes as a completely nonpolluting fuel it may hold the answer to growing environmental concerns about atmospheric accumulation of carbon dioxide and the resultant greenhouse effect in this book peter hoffmann describes current research toward a hydrogen based economy he presents the history of hydrogen energy and discusses the environmental dangers of continued dependence on fossil fuels hydrogen is not an energy source but a carrier that like electricity must be manufactured today hydrogen is manufactured by decarbonizing fossil fuels in the future it will be derived from water and solar energy and perhaps from cleaner versions of nuclear energy because it can be made by a variety of methods hoffmann argues it can be easily adapted by different countries and economies hoffmann acknowledges the social political and economic difficulties in replacing current energy systems with an entirely new one although the process of converting to a hydrogen based economy would be complex he demonstrates that the environmental and health benefits would far outweigh the costs

Hybrid Systems Based on Solid Oxide Fuel Cells

2017-06-12

fuel cell technology is the most exciting and legitimate alternative source of power currently available to us as world resources of non renewable fuel continue to be depleted no other power generating technology holds the same benefits that fuel cells offer including high reliability and efficiency negligible environmental impact and security of supply fuel cells run on hydrogen the simplest and most plentiful gas in the universe although they can also run on carbon monoxide methane or even coal their applications are diverse from powering automobiles buildings and portable electronics to converting methane gas from wastewater plants and landfills into electricity fuel cells engines and hydrogen is a controversial text that challenges the accepted industry parameters for measuring fuel cell performance and efficiency based on his inter disciplinary experience in the fields of power nuclear power and desalination the author contends that the development potential of the fuel cell is related to the quantity fuel chemical exergy which like electrical potential is a quantitative measure of work done the fuel cell community currently characterises these devices in terms of the enthalpy of combustion calorific value however the author argues a correct qualitatively different and fourfold larger characterisation is via the fuel chemical exergy in units of work and not energy he asserts that the distortion introduced by this

accepted perspective needs to be corrected before relatively efficient fuel cells integrated with comparatively low performing gas turbines reach the market fuel cells engines and hydrogen features a foreword by dr gerry agnew executive vp engineering of rolls royce fuel cells systems ltd it is essential reading for all engineers involved with fuel cells and or the manufacture of hydrogen from natural gas as well as academics in related disciplines such as thermodynamics physical chemistry materials physics mechanical and chemical engineering

Overpotential

2012

since the mid 1990s the emergence of a hydrogen economy and the speed with which it will arrive have been vigorously debated as a disruptive technology dominant designs for the production storage and distribution of hydrogen have not yet been established neither have performance characteristics been achieved to compete with the existing combustion engine though the efficiency and durability of hydrogen fuel cells are improving this publication highlights the uncertainties involved in making choices about hydrogen and fuel cells in planning the development policies on national energy environment and transport sector publisher s description

Tomorrow's Energy

2002-08-23

fuel cell engines is an introduction to the fundamental principles of electrochemistry thermodynamics kinetics material science and transport applied specifically to fuel cells it covers scientific fundamentals and provides a basic understanding that enables proper technical decision making

Fuel Cells, Engines and Hydrogen

2006-07-11

fuel cells are one of the cleanest and most efficient technologies for generating electricity since there is no combustion there are none of the pollutants commonly produced by boilers and furnaces for systems designed to consume hydrogen directly the only products are electricity water and heat fuel cells are an important technology for a potentially wide variety of applications including on site electric power for households and commercial buildings supplemental or auxiliary power to support car truck and aircraft systems power for personal mass and commercial transportation and the modular addition

by utilities of new power generation closely tailored to meet growth in power consumption these applications will be in a large number of industries worldwide in this seventh edition of the fuel cell handbook we have discussed the solid state energy conversion alliance program seca activities in addition individual fuel cell technologies and other supporting materials have been updated

Making Choices about Hydrogen

2008

this reference guide provides a detailed perspective on the investing opportunities in hydrogen and fuel cell technologies and services as well as an indication of the direction of trends in the sector significant attention is also given to the companies operating within the sector

Fuel Cell Systems Explained

2003

presenting the latest research in the control of fuel cell technology this book will contribute to the commercial viability of the technology the authors background in automotive technology gives the work added authority as a vital element of future planning

Fuel Cell Engines

2008-03-07

discusses how to derive clean renewable energy from fuel cells

Fuel Cell Handbook (Seventh Edition)

2016-05-08

high temperature solid oxide fuel cell sofc technology is a promising power generation option that features high electrical efficiency and low emissions of environmentally polluting gases such as co2 noox

and sox it is ideal for distributed stationary power generation applications where both high efficiency electricity and high quality heat are in strong demand for the past few decades sofc technology has attracted intense worldwide r d effort and along with polymer electrolyte membrane fuel cell pemfc technology has undergone extensive commercialization development this book presents a systematic and in depth narrative of the technology from the perspective of fundamentals providing comprehensive theoretical analysis and innovative characterization techniques for sofc technology the book initially deals with the basics and development of sofc technology from cell materials to fundamental thermodynamics electronic properties of solids and charged particle transport this coverage is extended with a thorough analysis of such operational features as current flow and energy balance and on to voltage losses and electrical efficiency furthermore the book also covers the important issues of fuel cell stability and durability with chapters on performance characterization fuel processing and electrode poisoning finally the book provides a comprehensive review for sofc materials and fabrication techniques a series of useful scientific appendices rounds off the book solid oxide fuel cell technology is a standard reference for all those researching this important field as well as those working in the power industry provides a comprehensive review of solid oxide fuel cells from history and design to chemistry and materials development presents analysis of operational features including current flow energy balance voltage losses and electrical efficiency explores fuel cell stability and durability with specific chapters examining performance characterization fuel processing and electrode poisoning

Investing In Hydrogen & Fuel Cells

2011-01-10

the increasing demand for energy and the related environmental concerns are the main drivers for the strong interest in biomass fermentation towards usage in fuel cells the integration of biomass fermentation bf and fuel cells fc technology creates a new and interdisciplinary research area due to their high efficiency fuel cells are therefore considered as a strategic technology for future energy supply systems the fact that biomass is a renewable source of energy in combination with the most efficient energy conversion system fc makes this combination unique and advantageous this book has a clear orientation towards making products of our waste biofuels for fuel cells comes at a time when this field is rapidly developing and there is a need for a synthetising book the holistic and multidisciplinary description of this topic including discussion of technological socio economic system analysis and policy and regulatory aspects make this book the definitive work for this market biofuels for fuel cells will cross link scientists of all fields concerned with biomass fermentation fuel upgrading and fuel cells at european and world level

Control of Fuel Cell Power Systems

2004-09-16

presents innovative approaches towards affordable highly efficient and reliable sustainable energy systems written by leading experts on the subject this book provides not only a basic introduction and

understanding of conventional fuel cell principle but also an updated view of the most recent developments in this field it focuses on the new energy conversion technologies based on both electrolyte and electrolyte free fuel cells from advanced novel ceria based composite electrolyte low temperature solid oxide fuel cells to non electrolyte fuel cells as advanced fuel to electricity conversion technology solid oxide fuel cells from electrolyte based to electrolyte free devices is divided into three parts part i covers the latest developments of anode electrolyte and cathode materials as well as the sofc technologies part ii discusses the non electrolyte or semiconductor based membrane fuel cells part iii focuses on engineering efforts on materials technology devices and stack developments and looks at various applications and new opportunities of sofc using both the electrolyte and non electrolyte principles including integrated fuel cell systems with electrolysis solar energy and more offers knowledge on how to realize highly efficient fuel cells with novel device structures shows the opportunity to transform the future fuel cell markets and the possibility to commercialize fuel cells in an extended range of applications presents a unique collection of contributions on the development of solid oxide fuel cells from electrolyte based to non electrolyte based technology provides a more comprehensive understanding of the advances in fuel cells and bridges the knowledge from traditional sofc to the new concept allows readers to track the development from the conventional sofc to the non electrolyte or single component fuel cell solid oxide fuel cells from electrolyte based to electrolyte free devices will serve as an important reference work to students scientists engineers researchers and technology developers in the fuel cell field

Goodbye, Gasoline

2008-07

newly revised the second edition of this pioneering work addresses emerging factors affecting energy production and use including the availability and desirability of various fuels the text provides extensive discussion on hydrogen sources both solar and nuclear and fuel cell technology as well as other alternative fuels such as biomass and wind power it delves into cost analysis regulatory issues barriers to implementation conversion and storage systems thermodynamic efficiency fuel chain efficiency air emission issues and safety the book also covers natural gas hydrogen gas methanol ethanol and steam reforming pub desc

Solid Oxide Fuel Cell Technology

2009-07-30

pem water electrolysis a volume in the hydrogen energy and fuel cell primers series presents the most recent advances in the field it brings together information that has thus far been scattered in many different sources under one single title making it a useful reference for industry professionals researchers and graduate students volumes one and two allow readers to identify technology gaps for

commercially viable pem electrolysis systems for energy applications and examine the fundamentals of pem electrolysis and selected research topics that are top of mind for the academic and industry community such as gas cross over and ast protocols the book lays the foundation for the exploration of the current industrial trends for pem electrolysis such as power to gas application and a strong focus on the current trends in the application of pem electrolysis associated with energy storage presents the fundamentals and most current knowledge in proton exchange membrane water electrolyzers explores the technology gaps and challenges for commercial deployment of pem water electrolysis technologies includes unconventional systems such as ozone generators brings together information from many different sources under one single title making it a useful reference for industry professionals researchers and graduate students alike

Biofuels for Fuel Cells

2005-09-30

the comprehensive accessible introduction to fuel cells their applications and the challenges they pose fuel cells electrochemical energy devices that produce electricity and heat present a significant opportunity for cleaner easier and more practical energy however the excitement over fuel cells within the research community has led to such rapid innovation and development that it can be difficult for those not intimately familiar with the science involved to figure out exactly how this new technology can be used fuel cells problems and solutions second edition addresses this issue head on presenting the most important information about these remarkable power sources in an easy to understand way comprising four important sections the book explores the fundamentals of fuel cells how they work their history and much more the major types of fuel cells including proton exchange membrane fuel cells pemfc direct liquid fuel cells dlfc and many others the scientific and engineering problems related to fuel cell technology the commercialization of fuel cells including a look at their uses around the world now in its second edition this book features fully revised coverage of the modeling of fuel cells and small fuel cells for portable devices and all new chapters on the structural and wetting properties of fuel cell components experimental methods for fuel cell stacks and nonconventional design principles for fuel cells bringing the content fully up to date designed for advanced undergraduate and graduate students in engineering and chemistry programs as well as professionals working in related fields fuel cells is a compact and accessible introduction to the exciting world of fuel cells and why they matter

Solid Oxide Fuel Cells

2020-02-24

today s consumers of portable electronics consumers are demanding devices not only deliver more power but also work healthy for the environment this fact alone has lead major corporations like intel bic duracell and microsoft to believe that microfuel cells could be the next generation power source for electronic products compact and readable microfuels principles and applications offers engineers and

product designers a reference unsurpassed by any other in the market the book starts with a clear and rigorous exposition of the fundamentals engineering principles governing energy conversion for small electronic devices followed by self contained chapters concerning applications the authors provide original points of view on all types of commercially available micro fuel cells types including micro proton exchange membrane fuel cells micro direct methanol fuel cells micro solid oxide fuel cells and micro bio fuel cells the book also contains a detailed introduction to the fabrication of the components and the assembly of the system making it a valuable reference both in terms of its application to product design and understanding micro engineering principles an overview of the micro fuel cell systems and applications a detailed introduction to the fabrication of the components and the assembly of the system original points of view on prospects of micro fuel cells

Alternative Fuels

2008

adopting a unique integrated engineering approach this text covers all aspects of fuel processing catalysts reactors chemical plant components and integrated system design while providing an introduction to the subject it also contains recent research developments making this an invaluable handbook for chemical power and process engineers electrochemists catalytic chemists materials scientists and engineers in power technology

PEM Water Electrolysis

2018-08-04

the book is a comprehensive reference book explaining concepts and their applications the interdisciplinary approach that draws on and clarifies the most recent research trends makes this book interesting to everyone who is concerned with energy demands and fuel cells jacket

Fuel Cells

2012-02-08

as the search for alternative fuels heats up no topic is hotter than fuel cells filling a glaring gap in the literature fuel cell fundamentals second edition gives advanced undergraduate and beginning level graduate students an important introduction to the basic science and engineering behind fuel cell technology emphasizing the foundational scientific principles that apply to any fuel cell type or technology

the text provides straightforward descriptions of how fuel cells work why they offer the potential for high efficiency and how their unique advantages can best be used designed to be accessible to fuel cell beginners the text is suitable for any engineering or science major with a background in calculus basic physics and elementary thermodynamics this new edition provides updated and enhanced examples problems and pedagogy for classroom use and features a significantly enlarged section on the practical applications of fuel cell technology a solutions manual will be developed

Micro Fuel Cells

2009-07-07

with contributions from noted laboratory scientists professors and engineers hydrogen energy and vehicle systems presents a new comprehensive approach for applying hydrogen based technologies to the transportation and electric power generation sectors it shows how these technologies can improve the efficiency and reliability of energy and trans

Fuel Processing

2008-05-05

fuel cells is a concise up to date and accessible guide to the evolution of the use of electrochemistry to generate power the author provides a comprehensive exploration of the history of fuel cells the environmental concerns which came into prominence in the 1980s and the economic factors associated with this method of power generation examples discussed include alkaline fuel cells phosphoric acid fuel cells molton carbonate fuel cells and solid oxide fuel cells making this a valuable and insightful read for those in the power generation market and those in electrochemistry such as engineers managers and academics explores multiple variations of fuel cell technology and evaluates their cost and application provides detailed historical context beginning in 1839 with the development of electrolysis discusses the most up to date advancements and methods of fuel cell technology today

Fuel Cells

2007

Fuel Cell Fundamentals

2006

Fuel Cells for the 21st Century

1999

Hydrogen Energy and Vehicle Systems

2016-04-19

Fuel Cells

2017-02-09

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