

Science and Engineering of Hydrogen-Based Energy Technologies

Hydrogen Production and Practical Applications in Energy Generation

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Hydrogen Production and Practical Applications in Energy Generation

Paulo Emilio de Miranda



Offers a panoramic overview of hydrogen energy, fuel cell operative principles, use of biomass and renewable sources to produce hydrogen, and social policies in one convenient reference

- Presents engineering fundamentals, commercially deployed technologies, up-and-coming developments and applications through a systemic approach
- Explores the integration of hydrogen technologies in renewable energy systems, including solar, wind, bioenergy and ocean energy
- Covers engineering standards, guidelines and regulations, as well as policy and social aspects for large-scale deployment of these technologies

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AUDIENCE: Engineers, researchers, professionals, graduate students, policy makers, analysts

Science and Engineering of Hydrogen-Based Energy Technologies explores the generation of energy using hydrogen and hydrogen-rich fuels in fuel cells from the perspective of its integration into renewable energy systems using the most sound and current scientific knowledge. The book first examines the evolution of energy utilization and the role expected to be played by hydrogen energy technologies in the world's energy mix, not just for energy generation, but also for carbon capture, storage and utilization. It provides a general overview of the most common and promising types of fuel cells, such as PEMFCs, SOFCs and direct alcohol fuel cells. The co-production of chemical and electrolysis cells, as well as the available and future materials for fuel cells production are discussed. It then delves into the production of hydrogen from biomass, including waste materials, and from excess electricity produced by other renewable energy sources, such as solar, wind, hydro and geothermal. The main technological approaches to hydrogen storage are presented, along with several possible hydrogen energy engineering applications.

Science and Engineering of Hydrogen-Based Energy Technologies's unique approach to hydrogen energy systems makes it useful for energy engineering researchers, professionals and graduate students in this field. Policy makers, energy planning and management professionals, and energy analysts can also benefit from the comprehensive overview that it provides.

TABLE OF CONTENTS

1. Hydrogen Energy | *Paulo Emilio de Miranda*
2. Fuel Cells | *Alberto Coralli, B. Sarruf, Paulo Emilio de Miranda, Luigi Osmieri, Stefania Specchia and Nguyen Q. Minh*
3. Potential of hydrogen production from biomass | *Debabrata Das and Vaishali Singh*
4. Energy Storage Using Hydrogen Produced from Excess Renewable Electricity: Power to Hydrogen | *D. Stolten and Marcelo Carmo*
5. Hydrogen Energy Engineering Applications and Products | *Hirohisa Uchinda and Makoto Ryo Harada*
6. Regulatory Framework, Safety Aspects and Social Acceptance of Hydrogen Energy Technologies | *Andrei V. Tchouvelev, Sergio Pinheiro de Oliveira and Newton Pimenta Neves Jr.*
7. Road Mapping | *David Hart*
8. Market, Commercialization, and Deployment of Hydrogen Energy Technologies | *Robert Steinberger-Wilckens and Beatrice Sampson*

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