DESCRIPTION

This four volume set brings together for the first time in a single reference work the fundamentals, principles and the current state-of-the-art in fuel cells. Its publication reflects the increasing importance of and the rapidly growing rate of research into alternative, clean sources of energy.

With internationally renowned Editors, International Advisory Board members, and Contributors from academia and industry, it guides the reader from the foundations and fundamental principles through to the latest technology and cutting-edge applications, ensuring a logical, consistent approach to the subject.

The Handbook is divided into three main themes, covered in four volumes:

* Volume 1: "Fundamentals and Survey of Systems"

* Volume 2: "Fuel Cell Electrocatalysis"

* Volumes 3 and 4: "Fuel Cell Technology and Applications"

Volume 1, "Fundamentals and Survey of Systems", provides the necessary background information on fuel cells, including the fundamental principles such as the thermodynamics and kinetics of fuel cell reactions, mass and heat transfer in fuel cells, and an overview of the key principles of the most important types of fuel cell, and their related systems and applications.
Volume 2, "Fuel Cell Electrocatalysis", is concerned with the most important basic phenomenon of fuel cell electrodes, electrocatalysis. It includes an introduction to the topic, and a detailed account of the theory. A number of the key practical methods used to study this phenomenon are discussed, as are a number of the key surface reactions. Finally, a number of other related topics associated with energy conversion are discussed.

Volumes 3 and 4, "Fuel Cell Technology and Applications" open with an overview of a range of sustainable energy supplies for fuel cell development. The key issue of fuel storage is considered in detail, before a detailed discussion of the most important types of fuel cells and their applications is presented. Among these, polymer electrolyte membrane fuel cell systems, alkaline fuel cell modules and systems, phosphoric acid fuel cells, direct methanol fuel cells, molten carbonate fuel cells and solid oxide fuel cells are covered in depth. The use of fuel cells in a range of systems is then considered, including portable systems, propulsion systems and electric utility systems. In addition to domestic and industrial systems, use of fuel cells in such novel environments as the space shuttle and submarines is addressed. Finally, Volume 4 closes with a discussion of the future prospects of fuel cell systems.

Comprising approximately 170 articles by more than 200 contributors, "The Handbook of Fuel Cells: Fundamentals, Technology and Applications", will be an invaluable source of reference for all those working directly in this important and dynamic field, for electrochemists, and for scientists, engineers and policy-makers involved in the quest for clean and sustainable energy sources.

⚠️ ABOUT THE AUTHOR

Wolf Vielstich started research work on Fuel Cells and Fischer-Tropsch Synthesis at Ruhrchemie / Oberhausen. Working in the field of Fundamental and Applied Electrochemistry at the Institute of Physical Chemistry of Bonn University, he completed his Habilitation in Physical Chemistry in 1962. From 1965 he was a professor and director at the Bonn Institute. His special interest was new experimental methods like Rotating Ring Electrodes, online MS, In situ IR and UHV-analysis of electrode surfaces, as well as to Batteries and Fuel Cells. His work in Electrochemistry has resulted in more than 250 publications, over 10 patents, books on Fuel Cells and Electrochemical Kinetics, and textbooks on Electrochemistry. From 1986 to 1993, Professor Vielstich was co-ordinator of the first European project on the DMFC and in 1998 he received the Faraday Medal of the Royal Chemical Society, UK.

Arnold Lamm has been involved in industrial research in this field for over 7 years, firstly at the DaimlerBenz research centre in Ulm, Germany, where his projects included methanol-reforming, methanolcatalysis, reactor engineering, thermodynamic calculations and system engineering of PEMFC-systems based on methanol. He also worked on the development of a simulation program as a basis for the first methanol-reformer car NECAR III. He also worked as Project leader (PEMFC-power station) at the former AEG Energietechnik T&D, Frankfurt, Germany in a project with Ballard Generation Systems. Since 1997 Dr Lamm
has been Senior manager for fuel cell systems at the central research of DaimlerChrysler, where his work has included a the demonstration of the worldwide first DMFC-vehicle, development of gasoline/diesel fuel processors for stationary and mobile applications and development of advanced components for FC-propulsion systems (e.g. air-supply). He holds over 40 patents on the fuel cell field.

Hubert A. Gasteiger has spent 9 years in academic research in fundamental electrocatalysis and fuel cell-related gas-phase catalysis, plus 5 years of industrial research and development in fuel cell components development. Dr Gasteiger was involved in the stack and stack-component design for GM / Opel's H2-powered Fuel Cell Cars (H1, H2, and H3), and since 1998 has been manager in stack components (membranes, catalysts, bipolar plate materials and coatings, MEAs) development at GM/Opel's Global Alternative Propulsion Center in Mainz-Kastel, Germany, and at GM's Fuel Cell Activities facility in Honeoye Falls, New York, USA. Dr Gasteiger has published 45 publications in refereed journals and co-chaired the 2000 Gordon Research Conference on Fuel Cells.

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