

Book review

Fuel Cells: Problems and Solutions, 2nd edition

V. S. Bagotsky. John Wiley and Sons, 2012,
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Fuel cells are of prime interest for a century now for energy conversion devices. This has been accurately reflected in the book titled *Fuel Cells: Problems and Applications*. This book is a perfect blend of fundamentals and applications and could be very useful for readers at both the beginner stage as well as in research and development. Divided into four major parts, this book outlines fundamentals in the first part with an emphasis on the history of fuel cells, then goes further into the classification and basis of different kinds of fuel cells and deals with major challenges in this field of research with interesting conclusions about the commercial aspects related to materials, processing, cost and performance, and scalability and capacity of fuel cell stations. The last part of the book also includes a chapter on fuel cells progression in various countries around the globe. The logically arranged case studies and associated issues with fuel cells have been neatly outlined in this book. Brevity of topics and future outlook is very useful for readers with an engineering bent but more into the applied aspects of the science. The focus on the type of fuel cells and associated problems related to proton-exchange membrane, direct methanol, phosphoric acid, alkaline, molten carbonate, solid oxide fuel cell types is particularly interesting and gives reader a complete overview of the field. For example, chapter on direct methanol fuel cell clearly details the major issues with these kinds of fuel cells, such as CO₂ build up in the device, catalyst degradation, and

chemical and environmental vulnerability of the device. Similarly, chapter on proton-exchange fuel cells describes the fundamentals behind the catalytic poisoning by trace of CO in hydrogen. Special attention has been given to device design and assembly, which is commonly not assimilated in one book. Scientific and engineering problems have been outlined with an emphasis on fuel management, catalysis, membrane properties and selection, and even mathematical modeling aspects. A chapter devoted on mathematical modeling of fuel cells is concise and manages to cater to the novice reader but not advanced computational materials and energy scientists. The chapter on modeling explains models on current–voltage characteristics of fuel cells, interfaces, design aspects, and fluid and heat flow.

I enjoyed reading the book. From an academician point of view, the content and amount of material covered in this book makes it an ideal choice for a beginner-level undergraduate text. However, research advisors can recommend it to the graduate students to gain knowledge about the fundamental and applied aspects of fuel cells. Apart from these, this book will be a perfect choice for someone delivering a short course on fuel cells in a professional society, where the target audience is industrial and emerging professionals.

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