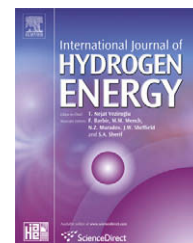


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## Book review

Fuel cell engines, Matthew M. Mench, John Wiley & Sons, Inc., 2008, 515 pp, with 252 figures and 46 tables, b&w, List: \$120, Amazon: \$96, ISBN 978-0471689584.

Fuel cell technology has experienced a dramatic booming of research and development in the recent twenty years. It starts to approach to our daily life from variety of perspectives including fuel cell vehicles, fuel cell power backup units, fuel cell powered portable electronic devices, and even fuel cell toys. It becomes more and more important to education of our future generation of researchers, engineers, and public or customers, and to provide them with sufficient amount of fundamental knowledge about fuel cells.

A statistics shows that there are more than 80 universities in the US (<http://www.fuelcells.org>) and more than 300 worldwide offering fuel cell courses; and obviously, this number keeps increasing every year. A fuel cell is a power generation device involving true multidisciplines including thermodynamics, heat/mass transport and fluid flow, electrochemistry, materials, controls, as well as many mechanical issues. Having more suitable textbooks covering comprehensive fundamentals and application technologies is a contingent task facing us, who teach a fuel cell course.

In June 2006, I met Dr. Matthew M. Mench at the 4th ASME International Fuel Cells Conference, and was told that he was teaching a fuel cell course in the Pennsylvania State University. I was immediately interested in the topics and materials he was using in his course. We exchanged our ideas about teaching such a course, and I got the privilege of seeing his course syllabus and promised to be one of the first batch of readers of his textbook being written, which I have now in my hand in 2008.

This book "Fuel Cell Engines" reflects the fruits of Dr. Mench's deep and wide research work, and teaching practice on this topic to both undergraduate and graduate students at the Pennsylvania State University. The book is written in a plain language and covers the most fundamental parts about fuel cells. For several subtopics, sufficient amount of background knowledge and introductory talk is

presented, to help readers getting a deeper and wider understanding. Readers of different backgrounds, no matter from thermo-sciences area, electrical engineering, material sciences, or chemical engineering, will find the necessary background knowledge for them to have a firm understanding about the disciplines involved in fuel cells without looking for reference books in their individual area. The book uses three chapters to present introductory knowledge about fuel cell thermodynamics and electrochemistry fundamentals. The electrochemical reaction kinetics and internal losses in a fuel cell is addressed in Chapter 4. Mass transport of ions and species and heat generation/transfer are presented in Chapter 5 with much better details than I have ever seen in other fuel cell textbooks. Resting on his massive research works and publications, the author presents a very deep and wide discussion about the specific issues in proton-exchange-membrane fuel cells in Chapter 6. Specific issues for other types of fuel cells are addressed in Chapter 7. The major fuel for fuel cells, hydrogen, is not a naturally occurring fuel. Issues concerning hydrogen production and storage are addressed in Chapter 8. Finally in Chapter 9, the experimental diagnostics and diagnosis – mostly from the author's research results – are presented. The whole textbook is arranged prudently, and context and connections between chapters are very smooth. The author also did a great effort to enrich the book with homework problems, which is important for a college textbook. Adopting this textbook in my current "Fuel Cell Fundamentals and Design" course, I saved a lot of time in designing homework problems which I had to do, last year.

I proudly recommend to readers and teachers this fuel cells textbook and thank the author, Dr. Matthew M. Mench, who gave me the privilege of reviewing this wonderful book.

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