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# Electrochemical Systems (Prentice-Hall International Series In The Physical And Chemical Engineering Sciences)



## Synopsis

The new edition of the cornerstone text on electrochemistry Spans all the areas of electrochemistry, from the basics of thermodynamics and electrode kinetics to transport phenomena in electrolytes, metals, and semiconductors. Newly updated and expanded, the Third Edition covers important new treatments, ideas, and technologies while also increasing the book's accessibility for readers in related fields. Rigorous and complete presentation of the fundamental concepts In-depth examples applying the concepts to real-life design problems Homework problems ranging from the reinforcing to the highly thought-provoking Extensive bibliography giving both the historical development of the field and references for the practicing electrochemist. --This text refers to an alternate Hardcover edition.

## Book Information

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## Customer Reviews

This is the BEST book on electrochemistry especially if you are interested in modeling. While it provides the most accurate description on the subject, it is hard to read. This has already been pointed out by other reviewers. But if you are doing modeling, you have to have the accurate understanding of the subject rather than just a good idea that other books could provide. This book is hard to read because it is precise and because one needs quite a lot of background before appreciating its content. As pointed out by the book itself, the subject is an interplay of heat/mass

transfer, fluid dynamics, kinetics, and thermodynamics. For me, the most difficult part is the thermodynamics and the book has the best and most accurate description on electrochemical potential, which is a thermodynamic concept. If you are not already comfortable with chemical potential, activity, and fugacity, you will find it hard to appreciate some the arguments made by Newman. This applies to other aspects but I myself have adequate background on those and do not struggle as much. For books of this level, do not expect to understand everything the first time. I have read some chapters quite a few times. And I got new understanding each time I read it. I wish the book could provide answers to some of the problems at the end of each chapter. For self-learners like myself, it is important to practice some problems to enhance the understanding.

This text is very complete - as far as general electrochemistry is concerned. I wish that it did a better job of outlining the electrochemical phenomena specific to applications; so corrosion - here's what happens, batteries... , fuel cells... , electroplating... , modelling... etc. As it stands, you have to be pretty familiar with exactly what is occurring in the specific research space - making it only useful for the occasional mental refresher, equation double-check or as a door stop. I did find that electrochemical expressions were clearly laid out, and that there were mathematical derivations. It is not the best for battery/ fuel cell research.

My background is electrical engineering and one day I had to study Newman's book for battery modeling. It seems hard to read at first glance. Nevertheless, for me this is due to a lack of background in thermodynamics, physical chemistry, as well as electrochemistry. After studying various books on thermodynamics, P. W. Atkins' physical chemistry (only the relevant contents) as well as the electrochemistry book by Carl H. Hamann, Andrew Hamnett and Wolf Vielstich (I recommend that book for self study on electrochemistry), I became much more comfortable of Newman's ideas and interpretation. In Chapters 11, 12 and 13, Newman let the readers do some of the detailed mathematical derivation steps (he did not give the detailed math since this book should be regarded as a standard classic in the field, rather than lecture notes), and I spent a lot of time in carrying out the procedure. No pains, no gains. I even believe that the self-derivation is a good homework in order to strengthen the students' mathematical ability in modeling. Then I turned to love this book and the more I read it, the more I love it. I love the clear concepts and most of my questions are answered by Newman just at the correct moment. It is good for theoretical modeling in the field of electrochemistry and hardly can one find a comparable book in the clarity and completeness of theoretical concepts in electrochemistry (Bard's book is more

experimental-oriented). Newman's thought is deep and the application of his work has led to many successful progress in battery modeling, as can be seen from various theoretical papers on J. Electrochem. Soc. using his theory. I thank Prof. Newman for doing this excellent work for us.

I bought Electrochemical Systems as a complement to Professor Newman's papers on current distribution. As some others have said, the book is hard to understand, although for me, that is due to the difficulty of the subject matter. If you want to derive some of the equations yourself, plan to fill in a lot of the steps (though this is quite typical for any text or paper). With so few steps shown, it will really stretch your understanding to see how the process unfolds. One thing that I really like about this book is that at the end of each chapter, before the references, they have compiled a list of the notation used in that chapter. That means you don't have to flip to the front of the book and try to find the symbols in a table for the whole book - instead, they are close by at the end of the chapter and narrowed down by what appears in that chapter. I noticed that Dr. Newman does this in his publications as well (at least the ones I have seen). I find this improves the readability quite a bit. Overall, I would recommend this book for anyone who wants to better understand the mathematical and physical basis of electrochemistry.

This is the most accessible electrochemical engineering text that I have seen and is a great companion for Bard's Electrochemical Methods textbook. The material is presented in a very understandable fashion.

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