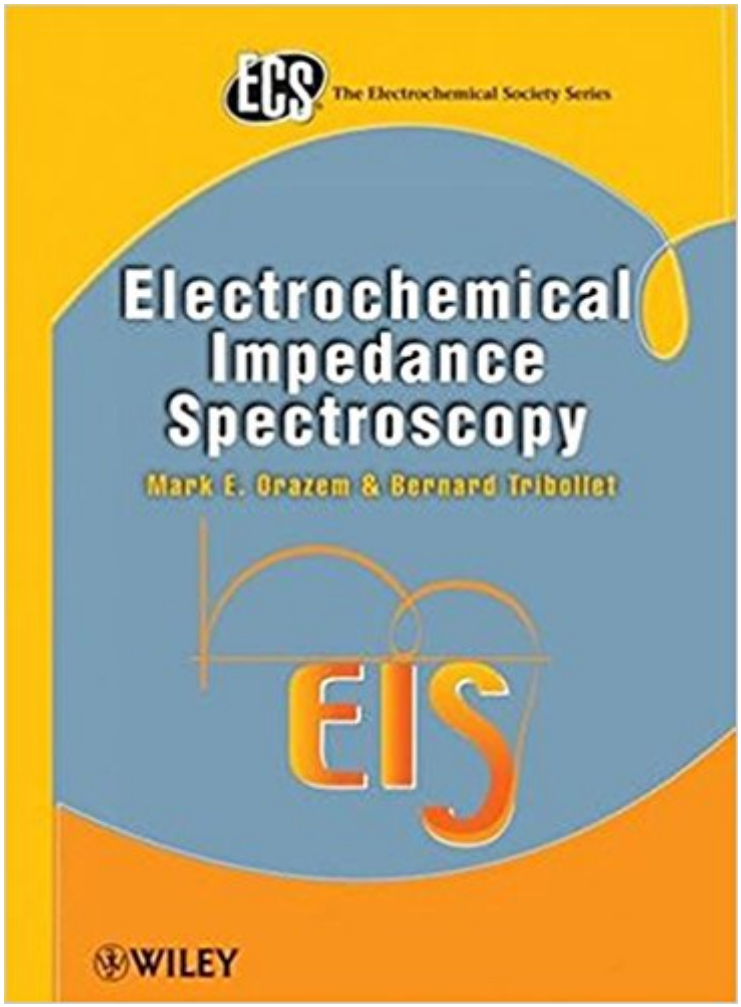
Electrochemical Impedance Spectroscopy



Synopsis

Using electrochemical impedance spectroscopy in a broad range of applications This book provides the background and training suitable for application of impedance spectroscopy to varied applications, such as corrosion, biomedical devices, semiconductors and solid-state devices, sensors, batteries, fuel cells, electrochemical capacitors, dielectric measurements, coatings, electrochromic materials, analytical chemistry, and imaging. The emphasis is on generally applicable fundamentals rather than on detailed treatment of applications. With numerous illustrative examples showing how these principles are applied to common impedance problems, Electrochemical Impedance Spectroscopy is ideal either for course study or for independent self-study, covering: Essential background, including complex variables, differential equations, statistics, electrical circuits, electrochemistry, and instrumentation Experimental techniques, including methods used to measure impedance and other transfer functions Process models, demonstrating how deterministic models of impedance response can be developed from physical and kinetic descriptions Interpretation strategies, describing methods of interpretating of impedance data, ranging from graphical methods to complex nonlinear regression Error structure, providing a conceptual understanding of stochastic, bias, and fitting errors in frequency-domain measurements An overview that provides a philosophy for electrochemical impedance spectroscopy that integrates experimental observation, model development, and error analysis This is an excellent textbook for graduate students in electrochemistry, materials science, and chemical engineering. It’s also a great self-study guide and reference for scientists and engineers who work with electrochemistry, corrosion, and electrochemical technology, including those in the biomedical field, and for users and vendors of impedance-measuring instrumentation.

Book Information

Hardcover: 560 pages
Publisher: Wiley-Interscience; 1 edition (September 9, 2008)
Language: English
ISBN-10: 0470041404
ISBN-13: 978-0470041406
Product Dimensions: 7.2 x 1.3 x 10.1 inches
Shipping Weight: 2.5 pounds (View shipping rates and policies)
Average Customer Review: 5.0 out of 5 stars 8 customer reviews
Best Sellers Rank: #566,241 in Books (See Top 100 in Books) #22 inÃ Â Books > Science & Math

> Chemistry > Electrochemistry #437 inÃ Â Books > Science & Math > Chemistry > Physical & Theoretical #1825 inÃ Â Books > Science & Math > Chemistry > General & Reference

Customer Reviews

"I am pleased to recommend their book to professionals and graduate students in a variety of disciplines such as electrochemistry, materials science, physics and electrical and chemical engineeringÃ¢â ¬Â¦" (Angewandte Chemie, February 16, 2009)

Using electrochemical impedance spectroscopy in a broad range of applications This book provides the background and training suitable for application of impedance spectroscopy to varied applications, such as corrosion, biomedical devices, semiconductors and solid-state devices, sensors, batteries, fuel cells, electrochemical capacitors, dielectric measurements, coatings, electrochromic materials, analytical chemistry, and imaging. The emphasis is on generally applicable fundamentals rather than on detailed treatment of applications. With numerous illustrative examples showing how these principles are applied to common impedance problems, Electrochemical Impedance Spectroscopy is ideal either for course study or for independent self-study, covering: Essential background, including complex variables, differential equations, statistics, electrical circuits, electrochemistry, and instrumentation Experimental techniques, including methods used to measure impedance and other transfer functions Process models, demonstrating how deterministic models of impedance response can be developed from physical and kinetic descriptions Interpretation strategies, describing methods of interpretating of impedance data, ranging from graphical methods to complex nonlinear regression Error structure, providing a conceptual understanding of stochastic, bias, and fitting errors in frequency-domain measurements An overview that provides a philosophy for electrochemical impedance spectroscopy that integrates experimental observation, model development, and error analysis This is an excellent textbook for graduate students in electrochemistry, materials science, and chemical engineering. It’s also a great self-study guide and reference for scientists and engineers who work with electrochemistry, corrosion, and electrochemical technology, including those in the biomedical field, and for users and vendors of impedance-measuring instrumentation.

Part of me was hoping for a nice pictorial handbook: "If your computer screen looks like this, your sample has a porous layer." But instead I’ve received a thoughtful treatment of fundamental principles with a generous sprinkling of (gasp) relevant derivations. This is a book I’ll need to read

one section at a time while pondering each new concept. Each section has a box with a little elephant and the words "Remember! Never short the wires together..." or something helpful like that. Diffusion is covered in depth in multiple chapters, and I expect I will eventually attain a very deep understanding of its effects on impedance spectra. Eventually.

A great guide to understanding impedance

AOK

This is the type of book with all that beginners need for understand the impedance. Mathematical background (complex number, statistical tools, differential equations), electrochemical instrumentation, many examples, really very clear and complete. The best book for beginners about impedance that I had seen.

Very Good both for beginners who wish to study EIS methods,but also for advanced users as a reference tool.

Well obviuously i bought this book becouse it is an excellent reference for my work... but it never come to my hand becouse the delivery service never found my address... Ãƒâ Â¬Ãƒâ Â¬I have always used the same address in my history with ... may be it is not a problem with but with the delivery system or services that they use.

There are essentially two books in this field (EIS), one by Barsoukov and JR Macdonald (2005) and this one. This book starts at basic level and provides detailed formulas and derivations and hence is student friendly. The book by Barsoukov et al is actually compilation of various chapters written by different authors and reflect the diversity of the authors (e.g. Battery, Fuel cells, Corrosion with details of point defect model by DD Macdonald). This book, on the other hand, emphasizes more on measurement models, error structures and so on. Understandably, the research work of the authors' have a strong influence on what areas are dealt with in more detail. If you want to get all the relevant details in one place, instead of rummaging through journal articles, this is very useful. e.g. The various types of representing impedance data, analysis (Nyquist, Lissajous, Bode) and the advantage of each type/method are all dealt with nicely. The chapter on Kramers Kronig relation is also, for example, a good compilation.One thing that I would like to see in these books is a link to a

permanent web page (perhaps in the publisher's site), where errata is posted, some simple programs useful for class room teaching or self learning can be downloaded, and additional new and relevant materials (or links to those) can be posted. For example, if the recent work by one of the authors on Kramers -Kronig relations ability to detect nonlinearities would be a good thing to add on and perhaps include in the next version of the book.

This is by far the best book on electrochemical impedance spectroscopy that I know of. This is THE book that I recommend to anyone who is interested in this topic.