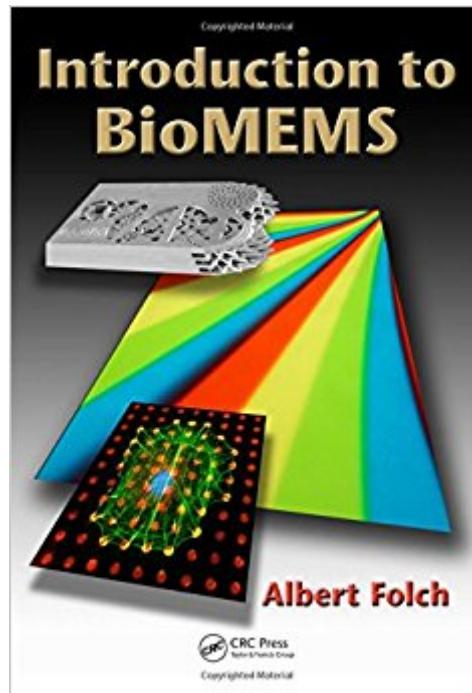




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# Introduction To BioMEMS



## Synopsis

The entire scope of the BioMEMS field •at your fingertipsHelping to educate the new generation of engineers and biologists, Introduction to BioMEMS explains how certain problems in biology and medicine benefit from and often require the miniaturization of devices. The book covers the whole breadth of this dynamic field, including classical microfabrication, microfluidics, tissue engineering, cell-based and noncell-based devices, and implantable systems. It focuses on high-impact, creative work encompassing all the scales of life •from biomolecules to cells, tissues, and organisms. Brilliant color presentationAvoiding the overwhelming details found in many engineering and physics texts, this groundbreaking book •in color throughout•includes only the most essential formulas as well as many noncalculation-based exercises. Important terms are highlighted in bold and defined in a glossary. The text contains more than 400 color figures, most of which are from the original researchers. Coverage of both historical perspectives and the latest developmentsDeveloped from the author's™s long-running course, this classroom-tested text gives readers a vivid picture of how the field has grown by presenting historical perspectives and a timeline of seminal discoveries. It also describes numerous state-of-the-art biomedical applications that benefit from "going small," including devices that record the electrical activity of brain cells, measure the diffusion of molecules in microfluidic channels, and allow for high-throughput studies of gene expression.

## Book Information

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## Customer Reviews

"I highly recommend this book for an advanced undergraduate or entry-level interdisciplinary graduate course in BioMEMS. It is well written and produced. The color figures differentiate it from other textbooks in this area and the author has done a thorough job documenting the history and current practices in this rapidly developing field. I plan to use it in my own class." •Joel A. Kubby, University of California, Santa Cruz, BioMedical Engineering OnLine, 2013

"In this classroom-tested textbook, Folch offers a broad, yet detailed lecture on BioMEMS, sharing information in clear, straightforward language and over 400 excellent color figures. The inclusion of only the most important formulae and thought experiments instead of involved mathematical exercises makes this textbook easily readable and relevant both to entry-level as well as advanced researchers. This also makes Introduction to BioMEMS a perfect guide and an easy-to-use comprehensive textbook for researchers from different science and engineering fields." •Ali Khademhosseini, Harvard Medical School and MIT, Lab on a Chip, 2013

"For anyone interested in learning more about the basics and applications of BioMEMS, I would give my most enthusiastic and unconditional recommendation to an excellent textbook in the field: Introduction to BioMEMS by Prof. Albert Folch. This textbook provides readers with an excellent balance of detailed descriptions and engaging visuals to describe key developments in BioMEMS technology. Additionally, the author highlights important formulas and explains underlying principles in a simple but thorough manner, which allows readers to gain a more comprehensive understanding of these biomedical devices and their applications. I highly recommend Introduction to BioMEMS for students interested in learning more about innovative, state-of-the-art biomedical applications. I believe this textbook is well-suited for students from a variety of backgrounds, as it does a brilliant job of explaining fundamental concepts and ideas. It is a valuable resource for instructors, as it contains practical exercises, tips for exams, and many sections that lend themselves to interesting classroom discussions. Ultimately, I believe Introduction to BioMEMS should be considered required reading for any student entering the field of BioMEMS. It can serve as the bible in the field." •Tony Jun Huang, The Pennsylvania State University, Microscopy and Microanalysis, 2013

"The field has been waiting for a true textbook that provides a practical, historical, authoritative and comprehensive introduction to bioMEMS. It has finally arrived, courtesy of Albert Folch, complete with PowerPoint lectures and thoughtful homework questions. I highly recommend it." •David J. Beebe, University of Wisconsin-Madison

"A comprehensive, colorful textbook on the important field of bioMEMS. I will definitely recommend to my students!" •Albert van den Berg, University of Twente

"Dr. Folch's book is a monumental achievement which brings an authoritative and comprehensive account to the rapidly growing, multidisciplinary field of bioMEMS. Many working scientists and engineers as well as students will

find this book fascinating."â•Mehmet Toner, Helen Andrus Benedict Professor of Bioengineering, Harvard Medical School "This book successfully integrates microfabrication and the physics of microfluidics with numerous biological applications. It provides a visual feast of images that lead to a comprehensive understanding of many complex concepts. Applications presented range from biomolecules to cells, tissues, and organisms, and are presented in clear, logical steps. It serves as an outstanding text for advanced undergraduates and graduate students, as well as an excellent review for researchers who are new to the field."â•Dr. Fawwaz Habbal, Harvard University "An excellent, easy-to-read textbook for everyone who wants to obtain a fundamental understanding of bioMEMS technology and get inspired about micro/nano bioengineering."â•Professor Nikos Chronis, University of Michigan "With extensive citations of the current literature, explanations that really put the technology in context, clear enunciation of the motivations for miniaturization, and historical perspective, the author has made the material very accessible and clear â | . I definitely recommend this textbook for bioengineering students."â•Professor Karen C. Cheung, University of British Columbia

Albert Folch is an associate professor in the Department of Bioengineering at the University of Washington. Dr. Folch has previously worked as a postdoc researcher at Harvard Universityâ™s Center for Engineering in Medicine, a postdoc researcher at MIT, and a visiting scientist at the Lawrence Berkeley National Laboratory. He is a recipient of an NSF CAREER Award and is on the advisory board of Lab on a Chip. His research focuses on the interface between cell biology and microfluidics.

I am extremely impressed with this book. Very insightful, informative, easy to follow, and extremely high-quality figures (400 high-quality figures, ALL in color). I enjoyed reading it very much; my students love it; I recommended it to my wife, who was trained in electrical engineering but no experience in MEMS/NEMS, and she enjoyed reading it too. I am very glad that the community eventually have a high-quality textbook. I appreciate Prof. Folch's dedication and hard work very much.-- Tony Jun Huang, Associate Professor in Penn State University

It will work as a supplement to other BioMEMS material, but is not very practical for the microfab part

Excellent Quality and protection for the book.

This book is a meaningful overview for how the field of microfluidics has developed over the past two decades. It is focused in large part on the applications of microfluidics to problems in biology and medicine and a captivating read for the bioengineering and biology students interested in this emerging field. At the same time, the book is a very practical reference source for experts. Several elegant microfluidic designs are singled out and described in detail in this book, rescued from the depth of complex scientific publications. The selection of figures is outstanding, presented in full color and rich in details. The book is packed with tips and practical advice to problems that everyone dealing with microfluidic devices has already encountered or will encounter at least once at the bench. By doing this, Dr. Albert Folch is not just an expert in the field of microfluidics. He is also a great teacher, sharing his extensive practical knowledge with generations of students to come.

I was in the market for a textbook to introduce the field of BioMEMS to graduate biomedical engineering students. This book includes all the things an instructor would look for in an instructional text. The book is very thorough in its discussion on concerns in the field of BioMEMS, and gives numerous examples of applications. It is well thought out and presents abstract details in exquisitely simple fashion. The boxed-off asides give excellent insight into the field and the continually references in the text to pioneers and leaders of the field will reinforce the concepts for the students and allow for scientific papers to be found in the literature. I would rate this textbook as five stars and I am happy that it is available

This book shows many ways of making small devices, their advantages and disadvantages, and how they are used in a biological environment. The book is helped enormously by being in color - the figures contribute so much. The book will be useful to anyone starting out in the field because it is so comprehensive. Check out the table of contents. A plus are the historical vignettes, showing how this field came to be. (I like the one about it only taking 25 years to get a microfluidic device into space.) (Disclaimer: I have written a couple of papers with the author, but I concentrated on the equations and math. This book explains so much...)

"does a brilliant job of explaining fundamental concepts and ideas...a valuable resource for instructors, as it contains practical exercises, tips for exams, and many sections that lend themselves to interesting classroom discussions.... required reading for any student....the bible in the field." -Microscopy & Microanalysis (review by Prof. Tony Jun Huang, Dept of Engineering

Science and Mechanics, The Pennsylvania State University)

I can't say enough about how impressive this book is. Every page is in color and is packed full of iconic figures from seminal papers in the field. This is a book that everyone who works on BioMEMS must have on their shelf.-- Prof. Nathan Sniadecki University of Washington Department of Mechanical Engineering

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