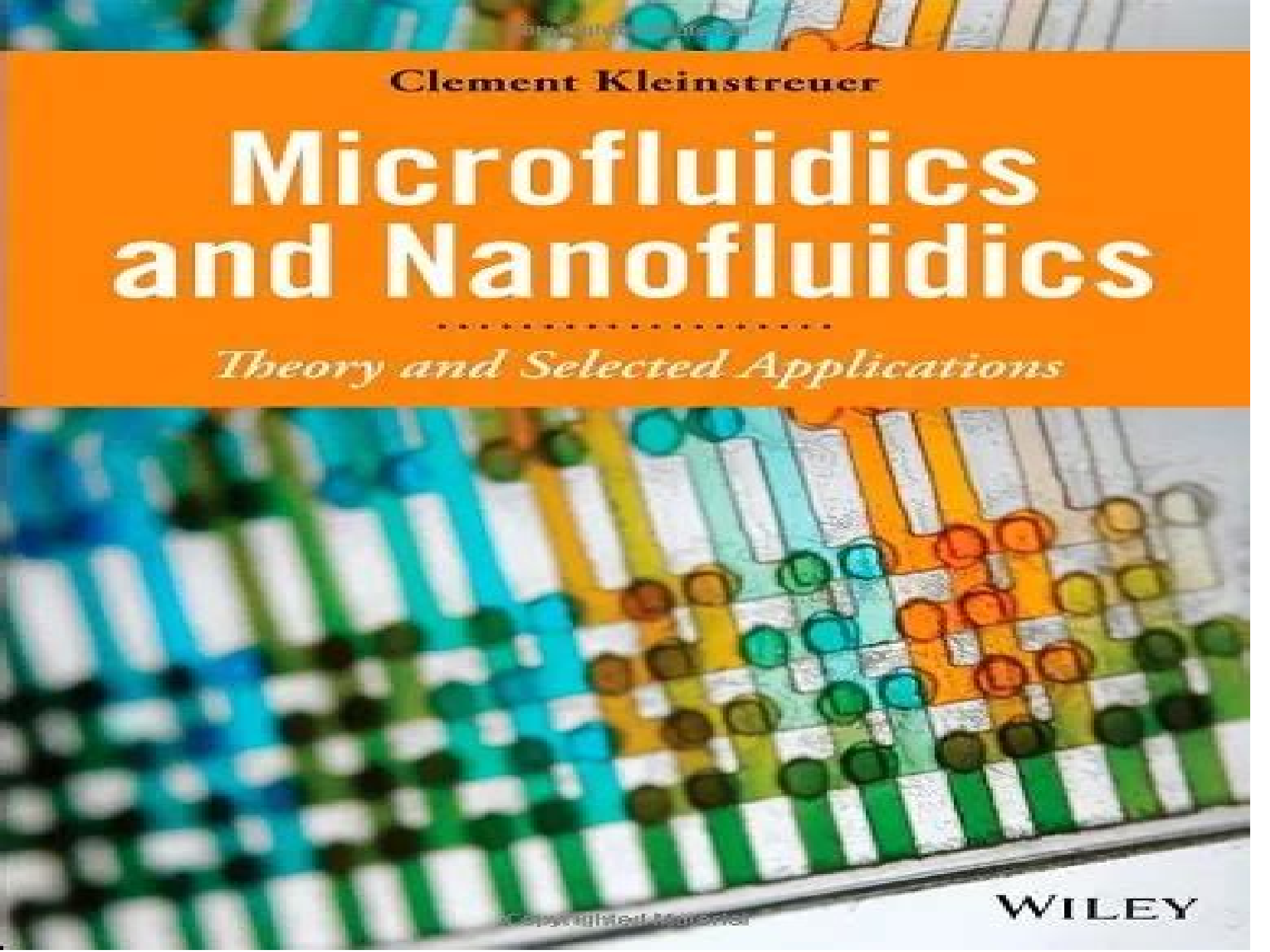


A close-up, angled view of a microfluidic chip. The chip features a grid of rectangular channels, some of which are filled with colored liquids (blue, green, yellow, orange, and red). The channels are interconnected, forming a complex network. The background is a solid orange color.

Clement Kleinstreuer

Microfluidics and Nanofluidics

Theory and Selected Applications

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Raj P. Chhabra



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Micro- and Biofluidics Avinash Kumar, Jitendra Kumar Katiyar, 2025-01-28 The main objective of this book is to understand and manipulate the physical chemical and biological processes that occur in microscale fluidic systems. It explains microfluidics and biofluidics and their application to innovative design and computational intelligence methods used for solving nonlinear problems of engineering. It also covers new evolving trends in engineering related to green technologies, biomedical devices, computer aided design, smart manufacturing, artificial intelligence systems, and sustainability. The book adopts a balanced approach between academic research and industrial applications. Features: Includes design and fabrication of microfluidic devices and systems for biological and medical applications. Investigates physical properties and behavior of fluids at the microscale level. Covers the development of microfluidic sensors and actuators for medical and environmental monitoring. Studies fluid dynamics in biological systems. Reviews tribological analysis of microfluidic and biofluidic devices for medical applications. This book is aimed at researchers and graduate students in fluid dynamics, mechanical engineering, and bioengineering.

Microsystems for Pharmatechnology Andreas Dietzel, 2016-01-22 This book provides a comprehensive state of the art review of microfluidic approaches and applications in pharmatechnology. It is appropriate for students with an interdisciplinary interest in both the pharmaceutical and engineering fields as well as process developers and scientists in the pharmaceutical industry. The authors cover new and advanced technologies for screening, production by micro reaction technology, and micro bioreactors, small scale processing of drug formulations, and drug delivery that will meet the need for fast and effective screening methods for drugs in different formulations as well as the production of drugs in very small volumes. Readers will find detailed chapters on the materials and techniques for fabrication of microfluidic devices, microbioreactors, microsystems for emulsification on chip, fabrication of drug delivery systems, respiratory drug delivery, and delivery through microneedles, organs on chip, and more.

CRC Handbook of Thermal Engineering Raj P. Chhabra, 2017-11-08 The CRC Handbook of Thermal Engineering Second Edition is a fully updated version of this respected reference work with chapters written by leading experts. Its first part covers basic concepts, equations, and principles of thermodynamics, heat transfer, and fluid dynamics. Following that is detailed coverage of major application areas such as bioengineering, energy efficient building systems, traditional and renewable energy sources, food processing, and aerospace heat transfer topics. The latest numerical and computational tools, microscale and nanoscale engineering, and new complex structured materials are also presented. Designed for easy reference, this new edition is a must.

have volume for engineers and researchers around the globe Microfluidics for Biologists Chandra K. Dixit,Ajeet Kaushik,2016-10-13 This book describes novel microtechnologies and integration strategies for developing a new class of assay systems to retrieve desired health information from patients in real time The selection and integration of sensor components and operational parameters for developing point of care POC are also described in detail The basics that govern the microfluidic regimen and the techniques and methods currently employed for fabricating microfluidic systems and integrating biosensors are thoroughly covered This book also describes the application of microfluidics in the field of cell and molecular biology single cell biology disease diagnostics as well as the commercially available systems that have been either introduced or have the potential of being used in research and development This is an ideal book for aiding biologists in understanding the fundamentals and applications of microfluidics This book also Describes the preparatory methods for developing 3 dimensional microfluidic structures and their use for Lab on a Chip design Explains the significance of miniaturization and integration of sensing components to develop wearable sensors for point of care POC Demonstrates the application of microfluidics to life sciences and analytical chemistry including disease diagnostics and separations Motivates new ideas related to novel platforms valving technology miniaturized transduction methods and device integration to develop next generation sequencing Discusses future prospects and challenges of the field of microfluidics in the areas of life sciences in general and diagnostics in particular **Microfluidics** Yujun Song,Daojian Cheng,Liang Zhao,2018-01-04 The first book offering a global overview of fundamental microfluidics and the wide range of possible applications for example in chemistry biology and biomedical science As such it summarizes recent progress in microfluidics including its origin and development the theoretical fundamentals and fabrication techniques for microfluidic devices The book also comprehensively covers the fluid mechanics physics and chemistry as well as applications in such different fields as detection and synthesis of inorganic and organic materials A useful reference for non specialists and a basic guideline for research scientists and technicians already active in this field or intending to work in microfluidics Heat Transfer Enhancement with Nanofluids Vincenzo Bianco,Oronzio Manca,Sergio Nardini,Kambiz Vafai,2015-04-01 Nanofluids are gaining the attention of scientists and researchers around the world This new category of heat transfer medium improves the thermal conductivity of fluid by suspending small solid particles within it and offers the possibility of increased heat transfer in a variety of applications Bringing together expert contributions from *Research and Technological Advances in Food Science* Bhanu Prakash,2021-11-30 The reduction in nutritional quality of food due to microbial contamination is a problem faced by much of the developing world To address contamination related hunger and malnutrition it is crucial to enforce quantitative and qualitative protection of agri food commodities after harvesting as well as to create low cost rational strategies to protect post harvest losses and nutritional properties of food products in a sustainable manner Research and Technological Advances in Food Science provides readers with a systematic and in depth understanding of basic and advanced concepts in food

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Coulson and Richardson's Chemical Engineering R. P. Chhabra,V. Shankar,2017-11-28 Coulson and Richardson s Chemical Engineering has been fully revised and updated to provide practitioners with an overview of chemical engineering Each reference book provides clear explanations of theory and thorough coverage of practical applications supported by case studies A worldwide team of editors and contributors have pooled their experience in adding new content and revising the old The authoritative style of the original volumes 1 to 3 has been retained but the content has been brought up to date and altered to be more useful to practicing engineers This complete reference to chemical engineering will support you throughout your career as it covers every key chemical engineering topic Coulson and Richardson s Chemical Engineering Volume 1B Heat and Mass Transfer Fundamentals and Applications Seventh Edition covers two of the main transport processes of interest to chemical engineers heat transfer and mass transfer and the relationships among them Covers two of the three main transport processes of interest to chemical engineers heat transfer and mass transfer and the relationships between them Includes reference material converted from textbooks Explores topics from foundational through technical Includes emerging applications numerical methods and computational tools

Modern Fluid Dynamics Clement Kleinstreuer,2018-04-25 Modern Fluid Dynamics Second Edition provides up to date coverage of intermediate and advanced fluids topics The text emphasizes fundamentals and applications supported by worked examples and case studies Scale analysis non Newtonian fluid flow surface coating convection heat transfer lubrication fluid particle dynamics microfluidics entropy generation and fluid structure interactions are among the topics covered Part A presents fluids principles and prepares readers for the applications of fluid dynamics covered in Part B which includes computer simulations and project writing A review of the engineering math needed for fluid dynamics is included in an appendix

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