

# MICROFLUIDIC TECHNOLOGIES FOR HUMAN HEALTH



# Microfluidic Technologies For Human Health

**Utkan Demirci, Robert Langer** 

# Microfluidic Technologies For Human Health:

Microfluidic Technologies for Human Health Utkan Demirci, Robert Langer, 2012 The field of microfluidics has in the last decade permeated many disciplines from physics to biology and chemistry and from bioengineering to medical research One of the most important applications of lab on a chip devices in medicine and related disciplines is disease diagnostics which involves steps from biological sample analyte loading to storage detection and analysis The chapters collected in this book detail recent advances in these processes using microfluidic devices and systems The reviews of portable devices for diagnostic purposes are likely to evoke interest and raise new research questions in interdisciplinary fields e g efficient MEMS microfluidic engineering driven by biological and medical applications. The variety of the selected topics general relevance of microfluidics in medical and bioengineering research fabrication advances in on chip sample detection and analysis and specific disease models ensures that each of them can be viewed in the larger context of microfluidic mediated diagnostics Microfluidic Technologies for Human Health Utkan Demirci, Robert Langer, Ali Khademhosseini, 2012 Ch 1 A microscale bioinspired cochlear like sensor Robert D White Robert Littrell and Karl Grosh ch 2 Systematic evaluation of the efficiencies of proteins and chemicals in pharmaceutical applications Morgan Hamon and Jong Wook Hong ch 3 Microfluidic glucose sensors Jithesh V Veetil und weitere ch 4 Applications of microfabrication and microfluidic techniques in mesenchymal stem cell research Abhijit Majumder und weitere ch 5 Patient specific modeling of low density lipoprotein transport in coronary arteries Ufuk Olgac ch 6 Point of care microdevices for global health diagnostics of infectious diseases Sau Yin Chin und weitere ch 7 Integrated microfluidic sample preparation for chip based molecular diagnostics Jane Y Zhang und weitere ch 8 Microfluidic devices for cellular proteomic studies Yihong Zhan and Chang Lu ch 9 Microfluidics for neuroscience novel tools and future implications Vivian M Hernandez and P Hande Ozdinler ch 10 Microfluidics on chip platforms as in vitro disease models Shan Gao Erkin Seker and Martin L Yarmush ch 11 Application of microfluidics in stem cell and tissue engineering Sasha H Bakhru Christopher Highley and Stefan Zappe ch 12 Microfluidic on the fly fabrication of microstructures for biomedical applications Edward Kang Sau Fung Wong and Sang Hoon Lee ch 13 Microfluidics as a promising tool toward distributed viral detection Elodie Sollier and Dino Di Carlo ch 14 Electrophoresis and dielectrophoresis for lab on a chip LOC analyses Yagmur Demircan Gurkan Yilmaz and Haluk Kulah ch 15 Ultrasonic embossing of carbon nanotubes for the fabrication of polymer microfluidic chips for DNA sample purification Puttachat Khuntontong Min Gong and Zhiping Wang ch 16 Ferrofluidics A Rezzan Kose and Hur Koser ch 17 Antibody based blood bioparticle capture and separation using microfluidics for global health ZhengYuan Luo und weitere ch 18 Applications of quantum dots for fluorescence imaging in biomedical research ShuQi Wang und weitere Advances in Prevention of Foodborne Pathogens of Public Health Concern during Manufacturing Aliyar Cyrus Fouladkhah, Bledar Bisha, 2019-11-27 According to a report from the U S Centers for Disease Control and Prevention CDC achieving safe and healthier foods was one of the top ten

achievements of public health in the 20th century However considerable persisting challenges currently exist in developed nations and developing economies for further assuring the safety and security of the food supplies According to CDC estimates as many as 3000 American adults as an example and based on a recent epidemiological estimate of the World Health Organization around 420 000 individuals around the globe lose their lives annually due to foodborne diseases This emphasizes the need for innovative and emerging interventions for further prevention or mitigation of the risk of foodborne microbial pathogens during food processing and manufacturing The current publication discusses recent advancements and progress in the elimination and decontamination of microbial pathogens during various stages of manufacturing and production Special emphasis is placed on hurdle validation studies investigating decontamination of non typhoidal Salmonella enterica serovars various serogroups of Shiga toxin producing Escherichia coli public health significant serotypes of Listeria monocytogenes and pathogenic species of Cronobacter **Open Microfluidic Technologies for Fundamental** and Applied Studies of Human Health and the Environment Ulri Nicole Lee, 2022 This dissertation discusses the applications for open microfluidics in emerging technologies for studying human health and the environment Open microfluidics is a sub field of microfluidics that is quickly gaining traction for technologies across biology and the environment The open nature of the microchannels enables flexibility to the user for adding or removing components and makes it simple to use Chapter 1 introduces how microfluidics has traditionally been used and provides a background of open microfluidics and the common methods used to fabricate devices Chapter 2 evaluates rapid injection molding a more economical version of traditional injection molding for open microfluidic cell based technologies Minimum dimensions and dimension accuracy are investigated for applications with fluorescence imaging Chapter 3 highlights a novel method for generating droplets in an open microfluidic device that utilizes natural hydrostatic pressure and therefore does not require pumps or external equipment to generate the droplets Additionally potential use cases are presented for applications in droplet manipulation patterning splitting and fusion Chapter 4 presents a layer by layer hydrogel patterning method made possible by spontaneous capillary flow An open microfluidic rail based device is used to pattern entire layers of hydrogels for biological applications in tissue engineering organoid development and 3D cell culture Chapter 5 presents a novel method for capturing airborne particles using microdroplets and open microfluidic channels for shuttling the collected sample across the device The work presented here demonstrates fundamental open microfluidic principles for droplet generation and fabrication as well as how open microfluidics can be applied to diverse fields of study such as hydrogel patterning and Renewable Energy and Environmental Technology Mo Jie Sun, Ying Jie Zhang, 2013-10-31 environmental sampling Selected peer reviewed papers from the 2013 International Conference on Renewable Energy and Environmental Technology REET 2013 September 21 22 2013 Jilin China **Proceedings of the 25th Annual International Conference of the** IEEE Engineering in Medicine and Biology Society IEEE Engineering in Medicine and Biology Society. Conference, 2003

Microfluidic Chip Applications in Cellular Studies Hsing-Yun Sharon Hsu, 2008 Salivary Diagnostics David Wong, 2008-11-11 Salivary Diagnostics describes the nature of saliva and the basis for its usefulness as a diagnostic fluid It then surveys and reviews the field of research moving on to detail the development of technologies and the deciphering of the human salivary proteome Technology and the Future of Health Care David Ellis, 2001-03-06 Most experts believe that innovation in every aspect of patient care will be nothing less than astonishing as we move into the next century Technology and the Future of Health Care brings together a remarkable group of health care visionaries who have identified and begun to analyze which trends and technological advances will likely shape and inform the next generation of medicine From fundamental advances in computing and administration research nursing and patient care delivery to noninvasive surgery biomolecular therapies bionics and beyond this ground breaking book offers professional executive level insight into topics that until recently existed only in the realm of science fiction Micro (MEMS) and Nanotechnologies for **Defense and Security** Thomas George, Z.-Y. Cheng, 2007 Proceedings of SPIE present the original research papers presented at SPIE conferences and other high quality conferences in the broad ranging fields of optics and photonics These books provide prompt access to the latest innovations in research and technology in their respective fields Proceedings of SPIE are among the most cited references in patent literature **Smart Medical and Biomedical Sensor Technology** Journal of the Chinese Chemical Society Zhongguo hua xue hui (Taipei, Taiwan), 2009 .2004 Science Iohn Michels (Journalist), 2009 Proceedings of the IVth International Symposium on Applications of Modelling as an Innovative Technology in the Agri-Food-Chain P. Barreiro, 2008 **Directory of Published Proceedings** ,2002 Advanced Environmental, Chemical, and Biological Sensing Technologies ..., 2004 **Encyclopedia of Medical Devices and** Instrumentation, Hydrocephalus, Tools for Diagnosis and Treatment of - Monoclonal Antibodies John G. Webster, 2006-04-07 The articles in The Encyclopedia of Medical Devices and Instrumentation focus on what is currently useful or is likely to be useful in future medicine They answer the question What are the branches of medicine and how does technology assist each of them Articles focus on the practice of medicine that is assisted by devices rather than including for example the use of drugs to treat disease The title is the only resource on the market dealing with the subject in encyclopedic detail Accessible to practitioners with a broad range of backgrounds from students to researchers and physicians Articles cover the latest developments such as nanotechnology fiber optics and signal processing **Government Research Directory** Cengage Gale, 2008-12 The Future of the 20th Century AHRC Research Centre for Textile Conservation and Textile Studies. Conference, 2006 The papers in this book consider the existence and preservation of modern materials in the textile field This is the first publication to present modern textiles as a subject in its own right and the content is intentionally multidisciplinary to demonstrate the wide spectrum of subjects involved in their preservation Contributors include artists curators anthropologists conservation scientists and conservators while topics cover the creation collecting interpretation

deterioration analysis and conservation of synthetic materials associated with textiles This is the second in a series of three volumes of papers from the conferences of the Research Centre for Textile Conservation and Textile Studies Textile Conservation Centre University of Southampton U K The first book Scientific Analysis of Ancient and Historic Textiles 1873132794 75 00 was published in 2005 Abstracts of the ... General Meeting of the American Society for Microbiology American Society for Microbiology. General Meeting, 2007

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