<<微系统和纳米技术>>

图书基本信息

书名：<<微系统和纳米技术>>

13位ISBN编号：9787302243076

10位ISBN编号：7302243077

出版时间：2011-11

出版时间：周兆英、王中林、 林立伟 清华大学出版社 (2011-11出版)

作者：周兆英，等 编

页数：1004

内容概要

微系统和纳米技术是微米纳米技术的两个重要组成部分，既有区别又有联系。
微系统和纳米技术是一个新兴的、多学科交叉的科技领域。
《微系统和纳米技术》由40多位国内外著名专家、学者分章撰写，分为微系统和纳米科学技术基础、微系统技术、纳米技术、应用问题、发展和展望等五个部分，共23章。
全书统一规划、各章独立、由浅入深、图文并茂。
《微系统和纳米技术》内容的一个重要特点是反映了美、德、英、日和我国权威专家在微系统和纳米技术领域的研究成果，同时也阐述了他们数十年来的研究经验和对该领域的展望，从科技发展的规律说明微米纳米科技发展的阶段性和成熟周期。
《微系统和纳米技术》可以作为相关领域本科生、研究生和教师的教学参考书，并可供相关的科技人员参考。

作者简介

Zhaoying Zhou Doctor， Professor of Department of Precision Instrument and Mechanology， vice-chairman of CHINESE SOCIETY OF MICRO-NANO TECHNOLOGY， editor of Journal of Micro Mechatronics. His research interests are in MEMS， Technology of measurement and control， Bio-medical instrument. He published more than 300 papers， 2 academic books. Zhonglin Wang Dr. Wang received his Ph.D in Physics from Arizona State University in 1987. After a year of post-doctoral in the State University of New York at Stony Brook in 1988， Dr. Wang was awarded a Research Fellowship by the Cavendish Laboratory， University of Cambridge， England. He received a U.S. Department of Energy Research Fellowship at Oak Ridge National Laboratory in 1989， and one year later he was appointed as a Research Associate Professor by the University of Tennessee. In 1993， he moved to the National Institute of Standards and Technology （NIST） to set up the microscopy facility. He joined Georgia Tech in 1995. Dr. Wang has been focused on the atomic dimension microstructures of materials of technological importance and their relationship with measured physical properties. The materials that he has been working on are functional and smart thin oxide films， nanoparticles and self-assembly， carbon nanotubes， nanowires and nanobelts of semiconductive materials， and magnetic nanophase materials. Dr. Wang has had extensive research experience on: applications of high-resolution transmission electron microscopy， nano-probe electron energy-loss spectroscopy and energy dispersive X-ray spectroscopy for quantitative structure determination of crystals and interfaces; electron holography and its applications for studying nanophase and catalysis materials; synthesis and characterization of monodispersive nanoparticles; thin oxide films for microelectronics applications; surface structure and its influence on thin film growth; dynamical diffraction and imaging theories of inelastically scattered electrons; and reflection electron microscopy and spectroscopy for surface analysis. Dr. Wang discovered the nanobelt in 2001， which is considered to be a ground-breaking work. The paper on nanobelt was the second most cited paper in chemistry in 2001-2003 world-wide. His paper on piezoelectric nanosprings was one of the most cited papers in materials science in 2004 world-wide. His recent invention of world ’s first nanogenerator will have profound impacts to implantable biosensors and molecular machines/robotics. In 1999， he and his colleagues discovered the world ’s smallest balance， nanobalance， which was selected as the breakthrough in nanotechnology by the America Physical Society. He was elected to the European Academy of Science （www.eurasc.org ） in 2002， fellow of the World Innovation Foundation （www.thewif.org.uk） in 2004， fellow of American Physical Society in 2005 ， has received the 2001 S.T. Li prize for Outstanding Contribution in Nanoscience and Nanotechnology， the 2000 and 2005 Georgia Tech Outstanding Faculty Research Author Awards， Sigma Xi 2005 sustain research awards， Sigma Xi 1998 and 2002 best paper awards， the 1999 Burton Medal from Microscopy Society of America， and 1998 China-NSF Oversea Outstanding Young Scientists Award. His most recent research focuses on oxide nanobelts and nanowires， in-situ techniques for nano-scale measurements， self-assembly nanostructures， fabrication of nano devices and nanosensors for biomedical applications. Liwei Lin Engineering Department and co-Director at the Berkeley Sensor and Actuator Center. He received his B.S. （1986） in Power Mechanical Engineering from National Tsinghua University， M.S. （1991） and Ph.D. （1993） in Mechanical Engineering from the University of California at Berkeley. He was an Associate Professor in the Institute of Applied Mechanics， National Taiwan University， Taiwan （1994～1996） and an Assistant Professor in Mechanical Engineering Department， University of Michigan （1996～1999）. His research interests are in design， modeling and fabrication of micro/nano structures， micro/nano sensors and micro/nano actuators as well as mechanical issues in micro/nano systems including heat transfer， solid/fluid mechanics and dynamics. Dr. Lin is the recipient of the 1998 NSF CAREER Award for research in MEMS Packaging and the 1999 ASME Journal of Heat Transfer best paper award for his work on micro scale bubble formation. Currently， he serves as a subject editor for the IEEE/ASME Journal of Microelectromechanical Systems and the North and South America Editor of Sensors and Actuators – A Physical. He led the effort to establish the MEMS division in ASME and served as the founding Chairman of the Executive Committee from 2004～2005. He is an ASME Fellow and has 10 issued US patents in the area of MEMS.

书籍目录

章节摘录

版权页： 插图： We have also developed a bioprocessor that exploits AC electroosmosis for concentrating bioparticles, such as cells and molecules. A combination of the AC electroosmotic flow and other EK forces are applied to concentrate bioparticles. The long-range bulk fluid flow transports the embedded particles to the region near the electrode surface, where other short-range EK forces trap the target cells and molecules. The advantage of AC electroosmosis is that only low applied voltage (a few volts) is required to generate the bulk fluid motion. The fluid flow can significantly increase the effective range of the bioprocessor while only small applied voltage is required. In addition, our device takes advantage of the hydrodynamic flow, which is effective for different sizes of objects, while maintaining the selectivity of EK forces to the targets through, for examples, size and electrical properties. A large variety of biological samples (from nanometer to micrometer range) can be concentrated on the same device by just changing the operating parameters. By optimizing the operating parameters, we have demonstrated concentration of various biological objects including E. coli bacteria, λ-phage DNA, and single-strand DNA fragments as small as 20 base pairs. 2.6.2 Mixing In a variety of processes, such as cell lyses, polymerase chain reaction (PCR), and DNA hybridization, the mixing of particles, cells, and molecules inside the microfluidic devices determines the efficiency of the whole system. Effective mixing procedures can significantly reduce the time required for the entire process. In macro scale devices, turbulence is generated and increases the contact area of the two or more fluids. Complete mixing is then achieved by molecular diffusion. Typical liquid flow in microfluidic devices has very low Reynolds number. Molecular diffusion is responsible for the mixing in the absence of turbulence and requires a long time for accomplishing thorough mixing. Using force perturbations to generate folds in the micro mixing device can increase the total interfacial area and hence reduce the necessary diffusion length and the required mixing mixing.

编辑推荐

《微系统和纳米技术》统一规划、各章独立、由浅入深、图文并茂。
《微系统和纳米技术》内容的一个重要特点是反映了美、德、英、日和我国权威专家在微系统和纳米技术领域的研究成果，同时也阐述了他们数十年来的研究经验和对该领域的展望，从科技发展的规律说明微米纳米科技发展的阶段性和成熟周期。