1. Record Nr. UNINA9910131617403321

Titolo	Micro- and nanomanipulation tools / / edited by Yu Sun and Xinyu Liu ; contributors, Alex Abramson [and sixty-five others]
Pubbl/distr/stampa	Weinheim, Germany : , : Wiley-VCH Verlag GmbH & Co. KGaA, , 2015 ©2015
ISBN	3-527-69025-5 3-527-69023-9 3-527-69022-0
Descrizione fisica	1 online resource (609 p.)
Collana	Advanced Micro & Nanosystems
Disciplina	537.6226
Soggetti	Nanoelectromechanical systems Micrurgy
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references at the end of each chapters and index.
Nota di contenuto	Cover; Title Page; Copyright; Contents; About the Editors; Series Editors Preface; Preface; List of Contributors; Chapter 1 High-Speed Microfluidic Manipulation of Cells; 1.1 Introduction; 1.2 Direct Cell Manipulation; 1.2.1 Electrical Cell Manipulation; 1.2.2 Magnetic Cell Manipulation; 1.2.3 Optical Cell Manipulation; 1.2.4 Mechanical Cell Manipulation; 1.2.4.1 Constriction-Based Cell Manipulation; 1.2.4.2 Shear-Induced Cell Manipulation; 1.3 Indirect Cell Manipulation; 1.3.1 Cell Separation; 1.3.1.1 Hydrodynamic (Passive) Cell Separation 1.3.1.2 Nonhydrodynamic (Active) Particle Separation1.3.2 Cell Alignment (Focusing); 1.3.2.1 Cell Alignment (Focusing) for Flow Cytometry; 1.3.2.2 Cell Solution Exchange; 1.4 Summary; Acknowledgments; References; Chapter 2 Micro and Nano Manipulation and Assembly by Optically Induced Electrokinetics; 2.1 Introduction; 2.2 Optically Induced Electrokinetic (OEK) Forces; 2.2.1 Classical Electrokinetic Forces; 2.2.1.1 Dielectrophoresis (DEP); 2.2.1.2 AC Electroosmosis (ACEO); 2.2.1.3 Electrothermal Effects (ET); 2.2.1.4 Buoyancy Effects; 2.2.1.5 Brownian Motion 2.2.2 Optically Induced Electrokinetic Forces2.2.2.1 OEK Chip: Operational Principle and Design; 2.2.2.2 Spectrum-Dependent ODEP

Force; 2.2.2.3 Waveform-Dependent ODEP Force; 2.3 OEK-Based Manipulation and Assembly; 2.3.1 Manipulation and Assembly of Nonbiological Materials; 2.3.2 Biological Entities: Cells and Molecules; 2.3.3 Manipulation of Fluidic Thin Films; 2.4 Summary; References; Chapter 3 Manipulation of DNA by Complex Confinement Using Nanofluidic Slits; 3.1 Introduction; 3.2 Slitlike Confinement of DNA; 3.3 Differential Slitlike Confinement of DNA; 3.4 Experimental Studies 3.5 Design of Complex Slitlike Devices3.6 Fabrication of Complex Slitlike Devices; 3.7 Experimental Conditions; 3.8 Conclusion; Disclaimer; References; Chapter 4 Microfluidic Approaches for Manipulation and Assembly of One-Dimensional Nanomaterials; 4.1 Introduction; 4.2 Microfluidic Assembly; 4.2.1 Hydrodynamic Focusing; 4.2.1.1 Concept and Mechanism; 4.2.1.2 2D and 3D Hierarchy; 4.2.1.3 Symmetrical and Asymmetrical Behavior; 4.2.2 HF-Based NW Assembly; 4.2.2.1 The Principle; 4.2.2.2 Device Design and Fabrication; 4.2.2.3 NW Assembly by Symmetrical Hydrodynamic Focusing 4.2.2.4 NW Assembly by Asymmetrical Hydrodynamic Focusing4.3 Summary; References; Chapter 5 Optically Assisted and Dielectrophoretical Manipulation of Cells and Molecules on Microfluidic Platforms; 5.1 Introduction; 5.2 Operating Principle and Fundamental Physics of the ODEP Platform; 5.2.1 ODEP Force; 5.2.2 Optically Induced ACEO Flow; 5.2.3 Electrothermal (ET) Force; 5.2.4 Experimental Setup of an ODEP Platform; 5.2.4.1 Light Source; 5.2.4.2 Materials of the Photoconductive Layer; 5.3 Applications of the ODEP Platform; 5.3.1 Cell Manipulation; 5.3.2 Cell Separation; 5.3.3 Cell Rotation 5.3.4 Cell Electroporation

Sommario/riassunto

Combining robotics with nanotechnology, this ready reference summarizes the fundamentals and emerging applications in this fascinating research field. This is the first book to introduce tools specifically designed and made for manipulating micro- and nanometer-sized objects, and presents such examples as semiconductor packaging and clinical diagnostics as well as surgery. The first part discusses various topics of on-chip and device-based micro- and nanomanipulation, including the use of acoustic, magnetic, optical or dielectrophoretic fields, while surface-driven and high-speed microfluidic