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Titolo	Methods in bioengineering : biomicrofabrication and biomicrofluidics / / Jeffrey D. Zahn, editor
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Collana	Artech House methods in bioengineering series
Altri autori (Persone)	ZahnJeffrey D
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Nota di contenuto	Methods in Bioengineering: Biomicrofabrication and Biomicrofluidics; Contents; Preface; Chapter 1 Microfabrication Techniques for Microfluidic Devices; 1.1 Introduction to microsystems and microfluidic devices; 1.2 Microfluidic systems: fabrication techniques; 1.3 Transfer processes; 1.3.1 Photolithography; 1.3.2 Molding; 1.4 Additive processes; 1.4.1 Growth of SiO2; 1.4.2 Deposition techniques; 1.5 Subtractive techniques; 1.5.1 Etching; 1.5.2 Chemical-mechanical polishing and planarization; 1.6 Bonding processes; 1.6.1 Lamination; 1.6.2 Wafer bonding methods; 1.7 Sacrificial layer techniques 1.8 Packaging processes1.8.1 Dicing; 1.8.2 Electrical interconnection and wire bonding; 1.8.3 Fluidic interconnection in microfluidic systems; 1.9 Materials for microfluidic and bio-MEMS applications; 1.9.1 Glass, pyrex, and quartz; 1.9.2 Silicon; 1.9.3 Elastomers; 1.9.4 Polydimethylsiloxane; 1.9.5 Epoxy; 1.9.6 SU-8 thick resists; 1.9.7 Thick positive resists; 1.9.8 Benzocyclobutene; 1.9.9 Polyimides; 1.9.10 Polycarbonate; 1.9.11 Polytetrafluoroethylene; 1.10 Troubleshooting table; 1.11 Summary; References; Chapter 2 Micropumping and Microvalving; 2.1 Introduction 2.2 Actuators for micropumps and microvalves2.2.1 Pneumatic

actuators; 2.2.2 Thermopneumatic actuators; 2.2.3 Solid-expansion actuators; 2.2.4 Bimetallic actuators; 2.2.5 Shape-memory alloy actuators; 2.2.6 Piezoelectric actuators; 2.2.7 Electrostatic actuators; 2.2.8 Electromagnetic actuators; 2.2.9 Electrochemical actuators; 2.2.10 Chemical actuators; 2.2.11 Capillary-force actuators; 2.3 Micropumps; 2.3.1 Mechanical pump; 2.3.2 Nonmechanical pump; 2.4 Microvalves; 2.4.1 Mechanical valve; 2.4.2 Nonmechanical valve; 2.5 Outlook; 2.6 Troubleshooting; 2.7 Summary points; References
Chapter 3 Micromixing Within Microfluidic Devices3.1 Introduction; 3.2 Materials; 3.2.1 Microfluidic mixing devices; 3.2.2 Microfluidic interconnects; 3.2.3 Optical assembly; 3.2.4 Required reagents; 3.3 Experimental design and methods; 3.3.1 Passive micromixers; 3.3.2 Active micromixers; 3.3.3 Multiphase mixers; 3.4 Data acquisition, anticipated results, and interpretation; 3.4.1 Computer acquisition; 3.4.2 Performance metrics, extent of mixing, reaction monitoring; 3.5 Discussion and commentary; 3.6 Troubleshooting; 3.7 Application notes; 3.8 Summary points; References
Chapter 4 On-Chip Electrophoresis and Isoelectric Focusing Methods for Quantitative Biology4.1 Introduction; 4.1.1 Microfluidic electrophoresis supports quantitative biology and medicine; 4.1.2 Biomedical applications of on-chip electrophoresis; 4.2 Materials; 4.2.1 Reagents; 4.2.2 Facilities/equipment; 4.3 Methods; 4.3.1 On chip polyacrylamide gel electrophoresis (PAGE); 4.3.2 Polyacrylamide gel electrophoresis based isoelectric focusing; 4.3.3 Data acquisition, anticipated results, and interpretation; 4.3.4 Results and discussion; 4.4 Discussion of pitfalls; 4.5 Summary notes

Sommario/riassunto

Written and edited by recognized experts in the field, the new Artech House Methods in Bioengineering series offers detailed guidance on authoritative methods for addressing specific bioengineering challenges. Offering a highly practical presentation of each topic, each book provides research engineers, scientists, and students with step-by-step procedures, clear examples, and effective ways to overcome problems that may be encountered. This unique volume presents leading-edge microfluidics methods used to handle, manipulate, and analyze cells, particles biological components (e.g., proteins and DNA) for microdiagnostics.