1. Record Nr. UNINA9910639996703321

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Titolo	Micro/Nanofluidic and Lab-on-a-Chip Devices for Biomedical Applications
Pubbl/distr/stampa	Basel, : MDPI - Multidisciplinary Digital Publishing Institute, 2022
ISBN	3-0365-6099-8
Descrizione fisica	1 electronic resource (232 p.)
Soggetti	Medicine
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Sommario/riassunto	Recently, microfluidic, nanofluidic and lab-on-a-chip devices have gained particular attention in biomedical applications. Due to their advantages, such as miniaturization, versatility, ease of use, cost-effectiveness, and the potential to replace animal models for drug development and testing, these devices hold tremendous potential to revolutionize the research of more effective treatments for several diseases that threaten human life. With integrated biosensors, these devices allow the development and design of micro- and nanoparticles to be studied in detail, modelling human physiology, investigating the molecular and cellular mechanisms underlying disease formation and progression, and gaining insights into the performance and long-term effects of responsive drug delivery nanocarriers. This Special Issue gathered research papers, and review articles focusing on novel microfluidic, nanofluidic and lab-on-a-chip devices for biomedical applications, addressing all steps related to fabrication, biosensor integration and development, characterization, numerical simulations and validation of the devices, optimization and, the translation of these devices from research labs to industry settings.