

1. Record Nr.	UNINA9910392724103321
Autore	Zhuang Bin
Titolo	Development of a Fully Integrated "Sample-In-Answer-Out" System for Automatic Genetic Analysis // by Bin Zhuang
Pubbl/distr/stampa	Singapore : , : Springer Singapore : , : Imprint : Springer, , 2018
ISBN	981-10-4753-7
Edizione	[1st ed. 2018.]
Descrizione fisica	1 online resource (XXIII, 114 p. 58 illus., 44 illus. in color.)
Collana	Springer Theses, Recognizing Outstanding Ph.D. Research, , 2190-5053
Disciplina	574.873282
Soggetti	Biomedical engineering Genetic engineering Nucleic acids Biomedical Engineering and Bioengineering Genetic Engineering Nucleic Acid Chemistry
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references at the end of each chapters.
Nota di contenuto	Introduction -- The construction of a general platform for capillary electrophoresis -- Integrated module for automatic DNA extraction and amplification -- A fully-integrated genetic analysis system -- Conclusion and prospects for future work.
Sommario/riassunto	This thesis reports on the development of a fully integrated and automated microsystem consisting of low-cost, disposable plastic chips for DNA extraction and PCR amplification, combined with a reusable glass capillary array electrophoresis chip, which can be employed in a modular-based format for genetic analysis. In the thesis, DNA extraction is performed by adopting a filter paper-based method, followed by an "in-situ" PCR carried out directly in the same reaction chamber of the chip without elution. PCR products are then co-injected with sizing standards into separation channels for detection using a novel injection electrode. The entire process is automatically carried out by a custom-made compact control and detection instrument. The author thoroughly tests the system's performance and reliability by conducting rapid genetic screening of mutations on congenital hearing

loss and pharmacogenetic typing of multiple warfarin-related single-nucleotide polymorphisms. The successful development and operation of this microsystem establishes the feasibility of rapid “sample-in-answer-out” testing in routine clinical practice.
