化学とマイクロ・ナノシステム研究会誌
Vol. 4, No. 1 (2005)

化学とマイクロ･ナノシステム

第 4 巻 第 1 号

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マイクロチップ電気泳動による高速光学異性体分離

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Rapid Enantioseparation by Microchip Electrophoresis

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Abstract

Microchip electrophoresis (MCE) can achieve faster analysis of small volumes of samples with high separation efficiency. These characteristics are suitable for the enantioseparation, and this technique enables chiral separations to be performed in seconds on microchips. Since a prerequisite for achieving sufficient resolution and detectability for chiral analyses is the application of appropriate detection methods providing sensitivity for target enantiomers with no dead volume between a separation channel and a detection site, various detection schemes have been introduced in the chiral MCE analysis. In the early stage of the investigation of the chiral MCE analysis, laser-induced fluorescence (LIF) spectrometry was mainly employed as a detection scheme. However, a drawback of the LIF detection is that most of the analytes should be derivatized prior to analysis, which is not only labor-intensive and sometimes troublesome but also affects the chiral recognition of selectors such as cyclodextrins. Thus, other detection methods, *e.g.*, UV absorption, electrochemical detection, conductometry, and so forth, have been also introduced in the MCE analysis of chiral compounds. This article gives an overview of original work done in the chiral MCE analysis with regard to approaches to improve resolution and sensitivity for enantiomers.

Keywords: Microchip Electrophoresis; Chiral Separation; Detection Method; Cyclodextrin Electrokinetic Chromatography

DNA 解析のためのナノバイオデバイスの開発

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Development of Nanobiodevices for DNA Analysis

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Abstract

Nanotechnologies are making a shift in the μTAS field from microfluidics to nanofluidics and show a great promise to generate innovative analytical techniques. In this paper, as a one of example of successful fusions of nanotechnologies and bioanalysis, we introduced the nanopillar chips for DNA separation, which consist of nanopillar array structures inside a microchannel. The nanopillar chips could apply for the separation of a wide size range of DNA molecules, from 1 to 166 kbp. For further development of these nanopillar chips, various factors affecting the performance of nanopillar chips, e.g. geometry of nanopillars and electroosmotic flows, were investigated from the both sides of actual experiments and numerical simulations. Fundamental study to elucidate a physical property of nanospace was also performed.

*Keywords:*Nanopillar chip; DNA; Electrophoresis; μTAS

トランスデューサーズ'05 国際会議報告

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13th International Conference on Solid-state Sensors, Actuators and Microsystems

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［技術レポート］

汎用 ELISA 装置: μEL400

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Microchip-Based ELISA (Enzyme-Linked Immunosorbent Assay) System: μEL400

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Abstract

A microchip-based enzyme-linked immunosorbent assay (ELISA) system, μ-, was developed. The system was composed of a microchip with a Y-shaped microchannel and a dam structure, polystyrene beads, and a thermal lens detector. All reactions required for the immunoassay were done automatically in the microchannel by successive introduction of a sample and reagents. By using this system, assay time was shortened and high sensitivity analysis was realized.

Keywords: Immunoassay; ELISA; Microchip; Thermal lens detector