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研究论文

基于微芯片电泳的脱氧核糖核酸片段的浓缩和分离

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摘要 采用超负荷电动供给(electrokinetic supercharging, EKS)预浓缩技术,在微芯片电泳(MCE)上对脱氧核糖核酸（DNA）片段进行浓缩和分离。EKS是集合样品电动进样(EKI)和过渡等速电泳(tITP)的一种在线浓缩方法。研究表明：采用该方法后,在40.5 mm长的单通道芯片上能够实现对低浓度样品的大量进样、浓缩和基线分离。在普通的紫外检测条件(检测波长为260 nm)下,对DNA片段的平均检出限(S/N=3)约为0.07 mg/L,仅为十字芯片上的微芯片电泳检出限的1/40。本文还对浓缩过程中的一些关键因素和定性分析进行了探讨。

关键词 微芯片电泳 超负荷电动供给 电动进样 过渡等速电泳 DNA片段

Preconcentration and separation of DNA fragments based on microchip electrophoresis

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Abstract

An online preconcentration method, electrokinetic supercharging (EKS) was used for the enrichment of DNA fragments based on microchip electrophoresis （MCE）. EKS is a process that combines electrokinetic injection (EKI) with transient isotachophoresis (tITP). The results demonstrated that the large volume of low concentration sample could be introduced, preconcentrated, and eventually separated on a single channel microchip with the whole length of 40.5 mm. The limit of detection (S/N=3) of DNA fragments was around 0.07 mg/L, effectively improved 40-fold by EKS preconcentration with the normal UV detection at 260 nm. Some important parameters for enhancing preconcentration and qualitative analysis were examined.

Key words microchip electrophoresis electrokinetic supercharging electrokinetic injection transient isotachophoresis DNA fragments

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