

毛细管非接触电导检测电极结构对检测性能的影响

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摘要:

毛细管非接触电导检测的检测性能与检测池的电极结构密切相关。目前, 电极对检测性能的影响主要从实验的角度进行讨论, 缺乏理论分析。本文提出了一种新的非接触电导检测池的等效电路模型。通过对检测池等效电路的仿真, 发现检测灵敏度与电极的有效长度有关; 屏蔽电极能够很好的消除高激发频率下低待测溶液电导值的输出电流幅值/溶液电导曲线的非线性, 提高了待测溶液电导的均匀性和最低检测限, 使输出电流幅值/激发频率曲线形成稳定的平台区, 很好的提高了检测系统的抗干扰能力。本文对提高非接触电导检测的灵敏度具有一定的理论指导作用。

关键词: 非接触电导检测, 电极, 等效电路, 参数, 灵敏度.

The effects of the electrode structure on the properties of contactless conductivity detector for microchip electrophoresis

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Abstract:

The performance of contactless conductivity detector (CCD) depends greatly on the electrode structures. However, at present many discussions about the effects of electrode on the performance are inclined to be based on experimental results, and analyses in theory are relatively not enough. In this paper a novel equivalent circuitry model of cell was presented consisting of a network of resistors and capacitors. The aim of the work reported in this contribution was a more thorough theoretical investigation of the effects of electrode structure on the performance of CCD. Through the simulation on the equivalent circuitry model, the detection sensitivity is relative to the effective length of the electrode. It was found that Faraday shield eliminates very well nonlinearity of analytes' conductance response of output current under high frequency, which optimizes the stability of current response for different analytes and detection limits. It was also found that a plateau region appears on the curve of frequency dependence of output current under effects of Faraday shields, therefore anti-jamming capability of the detector is improved. This paper will be helpful to give some theoretical guidance to improve the overall performance of CCD.

Keywords: Contactless conductivity detection, electrode, equivalent circuit, parameter, sensitivity. PACC: 0270, 0340G

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