

论文

单分子流式检测仪的研制

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摘要:

采用激光诱导荧光和流体动力学聚焦技术成功地研制出单分子流式检测仪, 实现了对水溶液中单个藻红蛋白及单个DNA分子片段的检测, 检测速率可达到每秒几十次. 与单分子荧光显微术相比, 流式分析将固定的标本台改为流动的单分子悬液, 大大提高了检测速率和统计精确性, 更加适合生物样品的快速、超高灵敏分析.

关键词: 单分子检测 流体聚焦 藻红蛋白

Development of a Single-molecule Flow Analyzer

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Abstract:

A single-molecule flow analyzer based on laser induced fluorescence and hydrodynamic focusing was developed in our lab. There were three key aspects of this design for achieving single molecule detection sensitivity: (1) a detector with a high photon-detection efficiency(>65% for avalanche photo-diode detector); (2) a small probe volume obtained by sheath-protected, hydrodynamically focused sample stream to reduce background; and (3) a slow flow to provide extended dwell time(millisecons) in the probe volume so that more fluorescence cycling can occur. The single molecule detection sensitivity was demonstrated by the successful detection of single phycoerythrin molecules. The house-constructed single-molecule flow analyzer was applied to DNA fragment sizing with linear correlation between DNA fragment length and mean burst size.

Keywords: Single-molecule detection Hydrodynamic focusing Phycoerythrin

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扩展功能

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