



2018年第45期总159期

## 农牧业信息化专题

### 本期导读

#### ▶ 前沿资讯

1. 突破所有已知细菌感染的诊断平台
2. 食品危害因子快速检测技术研发取得重要进展

#### ▶ 学术文献

1. 一次性荧光素基微流体芯片，用于快速检测水污染
2. 多功能微流体传感器集成平台

#### ▶ 相关专利

1. 防污染生物传感器

中国农业科学院农业信息研究所

联系人：王晶静

联系电话：010-82106769

邮箱：[agri@ckcest.cn](mailto:agri@ckcest.cn)

2018年11月5日

## ▶ 前沿资讯

### 1. Breakthrough test screens for all known bacterial infections (突破所有已知细菌感染的诊断平台)

**简介：**哥伦比亚大学梅尔曼公共卫生学院（Columbia University Mailman School of Public Health）感染与免疫中心（CII）的科学家开发出了第一个诊断平台，可以同时检测所有已知的人类致病菌，以及毒性和抗生素耐药性的标记物，发表在《mBio》期刊上的一项研究详细介绍了BacCapSeq平台的性能。CII博士后研究员、第一作者Orchid M. Allicock博士说：“一旦批准用于临床，BacCapSeq将给医生们提供一个强大的工具来快速精确地筛选所有已知的病原菌，包括那些导致败血症的细菌，这是美国第三大死亡原因。这个平台的灵敏度是传统无偏测试的1000倍，与每次只检测一种细菌的测试相当。”目前，最常用的败血症检测方法可能需要3天甚至更长时间才能提供抗生素耐药性信息。BacCapSeq平台可以在70小时内提供结果，但研究人员相信随着计算能力的提高，平台将变得更快。BacCapSeq包含420万个基因探针，用于检测所有307种病原菌的DNA特征，以及抗生素耐药性和毒性的生物标志物。每个探针绑定到相应的序列，当一个特定的细菌和生物标志物出现在一个样本中，一个磁性过程“拉出”它的独特序列，然后可以用来识别细菌和它的特征。迄今为止，即使是最先进的多路聚合酶链反应系统也只能筛选出多达19种致病菌，而且没有一种能够评估毒性和抗菌素耐药性。BacCapSeq是VirCapSeq的补充，VirCapSeq是CII为所有已知的人类病毒感染筛查开发的类似测试。最近发表的研究报道了这种测试在坦桑尼亚和乌干达的表现。真菌感染的鉴别诊断也正在进行中。

**来源：** ScienceDaily

**发布日期：**2018-10-23

**全文链接：**

<http://agri.ckcest.cn/file1/M00/02/9B/Csgk0FvaYbaAbpUiAANM7q8YBE8086.pdf>

### 2. 食品危害因子快速检测技术研发取得重要进展

**简介：**针对食品危害因子的理化性质，利用近红外荧光检测、特异性识别分析等先进分析方法，开发简便高效的食品安全快速检测新方法是国内外的研究热点。南开大学天津市食品科学与健康重点实验室王硕研究团队在“十二五”国家科技支撑计划、国家重点研发计划、国家自然科学基金重点项目等国家科技计划的支持下，食品危害因子快速检测技术研发取得重要进展。从优化制备功能型共价有机骨架材料出发，以具备优异的晶体结构稳定性和超大比表面积的多孔共价有机骨架材料为核心，借助流动注射-电感耦合等离子体质谱在线联用技术，实现了对于复杂食品基质中多种有毒金属元素的高灵敏度高选择性检测。方法简便高效，无需复杂的样品前处理，富集效率高且重现性好，可适用于乳制品等复杂基质样品的高灵敏高通量检测。该工作发表在Journal of Hazardous Materials (2018, 344, 220-229) 杂志上。利用所构建DNA多路选择器首次基于一种输出信号实现了对多种致病菌基因智能化选择性检测。所构建逻辑传感体系可自动判断样品中是否含有致病菌、含有哪种致病菌，并对其进行定量分析。该工作简化了实验操作及结果分析过程，降低对检测人员专业知识及技术水平要求，具有很好的实际应用价值。该工作以封面文章发表在Chemical Science (2018, 9, 1774-1781) 杂志上。

**来源：** 科技部

发布日期:2018-10-26

全文链接:

<http://agri.ckcest.cn/file1/M00/02/9B/Csgk0FvaYIKACUtxAAhvRTQbwxcg918.pdf>

## ➤ 学术文献

### 1. Disposable luciferase-based microfluidic chip for rapid assay of water pollution (一次性荧光素基微流体芯片, 用于快速检测水污染)

简介: In the present study, we demonstrate the use of a disposable luciferase-based microfluidic bioassay chip for environmental monitoring and methods for fabrication. The designed microfluidic system includes a chamber with immobilized enzymes of bioluminescent bacteria *Photobacterium leiognathi* and *Vibrio fischeri* and their substrates, which dissolve after the introduction of the water sample and thus activate bioluminescent reactions. Limits of detection for copper (II) sulfate, 1,3-dihydroxybenzene and 1,4-benzoquinone for the proposed microfluidic biosensor measured 3M, 15mM, and 2M respectively, and these values are higher or close to the level of conventional environmental biosensors based on lyophilized bacteria. Approaches for entrapment of enzymes on poly(methyl methacrylate) (PMMA) plates using a gelatin scaffold and solvent bonding of PMMA chip plates under room temperature were suggested. The proposed microfluidic system may be used with some available luminometers and future portable luminescence readers.

来源: LUMINESCENCE

发布日期:2018-06-21

全文链接:

<http://agri.ckcest.cn/file1/M00/02/9B/Csgk0FvaYCWAY7TIABUXBDyvP6M254.pdf>

### 2. Multi-function microfluidic platform for sensor integration (多功能微流体传感器集成平台)

简介: The limited availability of metabolite-specific sensors for continuous sampling and monitoring is one of the main bottlenecks contributing to failures in bioprocess development. Furthermore, only a limited number of approaches exist to connect currently available measurement systems with high throughput reactor units. This is especially relevant in the biocatalyst screening and characterization stage of process development. In this work, a strategy for sensor integration in microfluidic platforms is demonstrated, to address the need for rapid, cost-effective and high-throughput screening in bioprocesses. This platform is compatible with different sensor formats by enabling their replacement and was built in order to be highly flexible and thus suitable for a wide range of applications. Moreover, this re-usable platform can easily be connected to analytical equipment, such as HPLC, laboratory scale reactors or other microfluidic chips through the use of standardized fittings. In addition, the developed platform includes a two-sensor system interspersed with a mixing channel, which allows the detection of samples that might be outside the first sensor's range of

detection, through dilution of the sample solution up to 10 times. In order to highlight the features of the proposed platform, inline monitoring of glucose levels is presented and discussed. Glucose was chosen due to its importance in biotechnology as a relevant substrate. The platform demonstrated continuous measurement of substrate solutions for up to 12 h. Furthermore, the influence of the fluid velocity on substrate diffusion was observed, indicating the need for in-flow calibration to achieve a good quantitative output.

来源: NEW BIOTECHNOLOGY

发布日期:2018-03-06

全文链接:

[http://agri.ckcest.cn/file1/M00/02/9B/Csgk0FvaX0uAEtHLAA704WO\\_9iE199.pdf](http://agri.ckcest.cn/file1/M00/02/9B/Csgk0FvaX0uAEtHLAA704WO_9iE199.pdf)

## ➤ 相关专利

### 1. NONFOULING BIOSENSORS (防污染生物传感器)

简介: Disclosed are sensors that include a carbon nanotube channel and a non-fouling polymer layer, where the non-fouling polymer layer and the carbon nanotube channel do not directly contact each other and are separated by a dielectric layer. The disclosed sensors may be used, e.g., as biosensors for the accurate and sensitive detection of analytes within a sample. Also disclosed are methods of making and using the sensors.

来源: 世界知识产权组织

发布日期:2017-12-07

全文链接:

<http://agri.ckcest.cn/file1/M00/02/9B/Csgk0FvaXnCAYoWMAFd2rSKLzsU520.pdf>