



2019年第14期总181期

## 农牧业信息化专题

### 本期导读

#### ▶ 前沿资讯

1. 自动农场机器人在亚利桑那州进行演示：‘See DOT Run’
2. 新型纤维素基材料提供了一种三合一的传感器 - 一种基于离子-电子混合纤维素气凝胶的多参数压力-温度-湿度传感器

#### ▶ 学术文献

1. 新兴的食品安全分析即时检测技术
2. 一种基于稳定聚苯胺涂层丝网印刷碳电极和rGO-NR-Au@Pt的敏感再生电化学免疫传感器，用于大肠杆菌O157:H7的定量检测
3. 工业4.0:最新技术和未来趋势
4. “互联网+”现代农业发展模式的国际比较与借鉴

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)

2019年4月8日

更多资讯 尽在农业专业知识服务系统：<http://agri.ckcest.cn/>

## ▶ 前沿资讯

### 1 . Autonomous Farm Robot: 'See DOT Run' at Demo Day in

#### Arizona (自动农场机器人在亚利桑那州进行演示: 'See DOT Run')

**简介:** 在亚利桑那大学马里科帕研究农场举行的DOT演示日上, 与会者可能已经看到了即将成为现实的未来——全自动农场机器人。DOT 科技公司正准备在今年春天正式推出其全自动农场机器人, 预定的机器人将于2019年5月交付。DOT的开发始于5年前, 由加拿大萨斯喀彻温省SeedMaster公司的创始人Norbert Beaujot的一个想法和草图开始, 这台机器可以进行自主的田间作业, 包括播种、施肥、喷洒和帮助收割。当DOT推出时, 其准备好的工具列表将包括SeedMaster制造的播种机、液体肥料库尔特棒、Pattison生产的喷雾器(采用Raven Industries的鹰眼喷管控制系统)和谷物车。DOT 科技公司在演示日还宣布了与New Leader Manufacturing的令人兴奋的合作关系, New Leader Manufacturing是营养应用设备领域的领导者之一。他们将把G5系列撒布机的技术引入DOT平台, 支持可变速率养分应用和条带宽度控制等功能。在听完一系列有关DOT和相关产品公告的演示后, 演示日的与会者被邀请到户外观看机器的运行情况。帮助机器安全导航的仪器包括一系列雷达和激光雷达传感器, 它们不断地扫描前方的路径。尽管这台机器似乎已经准备好投入商业运行, 但在农场中推广仍有许多障碍, 包括建立经销商网络, 在田地之间运输机器的挑战, 以及说服种植者相信机器的价值。DOT 科技公司正在努力解决其中的许多障碍, 并正在开发一个经销商网络, 与其他短线制造商结成伙伴关系, 并倡导寻找能够让自动驾驶汽车在公共道路上安全运行的解决方案。让农民们考虑像DOT这样的自动机器的过程, 可能需要更长的时间。DOT 科技公司希望, 这类机器的普及将类似于20世纪之交的汽车普及, 或者更近一些的智能手机普及。虽然只有时间能证明一切, 但似乎自动机器的黎明即将来临, 而DOT的独特定位是成为第一批准备进行大面积耕作的机器人之一。

**来源:** precisionag.com

**发布日期:** 2019-03-29

**全文链接:**

[http://agri.ckcest.cn/file1/M00/06/68/Csgk0FykGvCAW\\_61AAVHkyIqku4880.pdf](http://agri.ckcest.cn/file1/M00/06/68/Csgk0FykGvCAW_61AAVHkyIqku4880.pdf)

### 2 . New cellulose-based material gives three sensors in one - A

#### multiparameter Pressure-Temperature-Humidity Sensor based on

#### Mixed Ionic-Electronic Cellulose Aerogels (新型纤维素基材料提供了一种三合一的传感器 - 一种基于离子-电子混合纤维素气凝胶的多参数压力-温度-湿度传感器)

**简介:** Cellulose soaked in a carefully designed polymer mixture acts as a sensor to measure pressure, temperature and humidity - at the same time! The measurements are completely independent of each other. The sensor may be highly significant in fields such as robotics, healthcare and security. The ability to measure pressure, temperature and humidity is important in many applications, such as monitoring patients at home, robotics, electronic skin, functional textiles, surveillance and security, to name just a few. Research until now has targeted integrating the different sensors into the same circuit, and this has presented several

更多资讯 尽在农业专业知识服务系统:<http://agri.ckcest.cn/>

technical challenges, not least concerning the interface to the user.

Scientists in the Laboratory of Organic Electronics at Linköping University have now, under the leadership of Professor Xavier Crispin, successfully combined all three measurements into a single sensor. This has been made possible by the development of an elastic aerogel of polymers that conducts both ions and electrons, and subsequent exploitation of the thermoelectric effect. A thermoelectric material is one in which electrons move from the cold side of the material towards the warm side, and in this way create a voltage difference. When nanofibres of cellulose are mixed with the conducting polymer PEDOT:PSS in water and the mixture is freeze-dried under vacuum, the resulting material has the same structure as a washing sponge, an aerogel. Adding a substance known as polysilane causes the sponge to become elastic. Applying an electrical potential across the material gives a linear current increase, typical of any resistor. But when the material is subject to a pressure, its resistance falls and electrons flow more readily through it. Since the material is thermoelectric, it is also possible to measure temperature changes: the larger the temperature difference between the warm and cold sides, the higher the voltage developed. The humidity affects how rapidly the ions move from the warm side to the cold one. If the humidity is zero, no ions are transported. "What is new is that we can distinguish between the thermoelectric response of the electrons (giving the temperature gradient) and that of the ions (giving the humidity level) by following the electrical signal versus time. That is because the two responses occur at different speeds", says Xavier Crispin, professor in the Laboratory of Organic Electronics and principal author of the article published in *Advanced Science*.

"This means that we can measure three parameters with one material, without the different measurements being coupled", he says. Shaobo Han, doctoral student, and Senior Lecturer Simone Fabiano at the Laboratory of Organic Electronics, have also found a way to separate the three signals from each other, such that each can be simply read individually. "Our unique sensor also prepares the way for the internet of things, and brings lower complexity and lower production costs. This is an advantage not least in the security industry. A further possible application is placing sensors into packages with sensitive goods", says Simone Fabiano.

来源: EurekaAlert

发布日期: 2019-03-25

全文链接:

[http://agri.ckcest.cn/file1/M00/06/68/Csgk0FykGeiAFG7zAASUy\\_zBqLI762.pdf](http://agri.ckcest.cn/file1/M00/06/68/Csgk0FykGeiAFG7zAASUy_zBqLI762.pdf)

## 学术文献

### 1. Emerging Point-of-care Technologies for Food Safety Analysis (新兴的食品安全分析即时检测技术)

简介: Food safety issues have recently attracted public concern. The deleterious effects of compromised food safety on health have rendered food safety analysis an approach of paramount importance. While conventional techniques such as high-performance liquid chromatography and mass spectrometry have traditionally been utilized for the detection of

更多资讯 尽在农业专业知识服务系统: <http://agri.ckcest.cn/>

food contaminants, they are relatively expensive, time-consuming and labor intensive, impeding their use for point-of-care (POC) applications. In addition, accessibility of these tests is limited in developing countries where food-related illnesses are prevalent. There is, therefore, an urgent need to develop simple and robust diagnostic POC devices. POC devices, including paper- and chip-based devices, are typically rapid, cost-effective and user-friendly, offering a tremendous potential for rapid food safety analysis at POC settings. Herein, we discuss the most recent advances in the development of emerging POC devices for food safety analysis. We first provide an overview of common food safety issues and the existing techniques for detecting food contaminants such as foodborne pathogens, chemicals, allergens, and toxins. The importance of rapid food safety analysis along with the beneficial use of miniaturized POC devices are subsequently reviewed. Finally, the existing challenges and future perspectives of developing the miniaturized POC devices for food safety monitoring are briefly discussed.

来源: SENSORS

发布日期: 2019-02-17

全文链接:

<http://agri.ckcest.cn/file1/M00/06/68/Csgk0FykFsCATB0YABnVK4QGDps835.pdf>

## **2 . A sensitive and regenerative electrochemical immunosensor for quantitative detection of *Escherichia coli* O157:H7 based on stable polyaniline coated screen-printed carbon electrode and rGO-NR-Au@Pt (一种基于稳定聚苯胺涂层丝网印刷碳电极和 rGO-NR-Au@Pt 的敏感再生电化学免疫传感器, 用于大肠杆菌 O157:H7 的定量检测)**

简介: A sensitive and quantitative sandwich electrochemical immunosensor was constructed for the detection of *Escherichia coli* O157:H7 (*E. coli* O157:H7) using immune gold@platinum nanoparticles (Au@Pt), neutral red (NR), reduced graphene oxide nanocomposite (rGO) and regenerative leucoemeraldine base polyaniline (PANI)/gold nanoparticles (AuNPs) modified screen-printed carbon electrode (SPCE). The batch production advantages of the SPCE were retained, its disposable characteristic was replaced by the possibility for reuse. The anti-*E. coli* O157:H7 monoclonal antibody ( $Ab_1$ ) was automatically adsorbed on the SPCE-PANI-AuNPs platform through the amino and AuNPs interaction. rGO-NR-Au@Pt as the non-enzyme signal label can enhance the performance of the immunoassay for the catalytic reduction of  $H_2O_2$  and amplify the current signal. All characterization steps were monitored by cyclic voltammetry (CV). Based on electrochemical detection of *E. coli* O157:H7, the linear range was from  $8.9 \times 10^3$  to  $8.9 \times 10^9$  CFU  $mL^{-1}$ , and limit of detection (LOD) was  $2.84 \times 10^3$  CFU  $mL^{-1}$ . To ensure that the immunosensor can be used repeatedly, ultrasound sonication was used to remove as many surface-bound antibodies as possible. This allows  $Ab_1$  to bind to the SPCE-PANI-AuNPs again after the electrode was re-incubated with the antibody solution, and hence, the displacement assay can be repeated and the sensor reused. Furthermore, it was demonstrated that the microchips can be regenerated and reused at least 5 times.

更多资讯 尽在农业专业知识服务系统: <http://agri.ckcest.cn/>

来源: ANALYTICAL METHODS

发布日期:2019-01-12

全文链接:

<http://agri.ckcest.cn/file1/M00/06/68/Csgk0FykFRKAXWckAA4jFnP2CwU867.pdf>

### 3 . Industry 4.0: state of the art and future trends (工业4. 0:最新技术和未来趋势)

简介: Rapid advances in industrialisation and informatisation methods have spurred tremendous progress in developing the next generation of manufacturing technology. Today, we are on the cusp of the Fourth Industrial Revolution. In 2013, amongst one of 10 Future Projects' identified by the German government as part of its High-Tech Strategy 2020 Action Plan, the Industry 4.0 project is considered to be a major endeavour for Germany to establish itself as a leader of integrated industry. In 2014, China's State Council unveiled their ten-year national plan, Made-in-China 2025, which was designed to transform China from the world's workshop into a world manufacturing power. Made-in-China 2025 is an initiative to comprehensively upgrade China's industry including the manufacturing sector. In Industry 4.0 and Made-in-China 2025, many applications require a combination of recently emerging new technologies, which is giving rise to the emergence of Industry 4.0. Such technologies originate from different disciplines including cyber-physical Systems, IoT, cloud computing, Industrial Integration, Enterprise Architecture, SOA, Business Process Management, Industrial Information Integration and others. At this present moment, the lack of powerful tools still poses a major obstacle for exploiting the full potential of Industry 4.0. In particular, formal methods and systems methods are crucial for realising Industry 4.0, which poses unique challenges. In this paper, we briefly survey the state of the art in the area of Industry 4.0 as it relates to industries.

来源: INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH

发布日期:2018-04

全文链接:

<http://agri.ckcest.cn/file1/M00/06/68/Csgk0FykGByASgQYAAyCaxt8sVI344.pdf>

### 4. “互联网+”现代农业发展模式的国际比较与借鉴

简介: 基于文献检索及专家技术前瞻, 归纳总结了国外主要国家“互联网+”现代农业的典型模式和前沿技术, 探讨了其对中国的经验借鉴。结果表明, 目前国外形成了美国全程全网络化精准农业、荷兰工厂化设施物联网、德国技术创新驱动型“互联网+”农机智造、日本适度规模经营型精细化农业、韩国服务引领型“互联网+”农技推广和印度软件产业主导型信息服务等6种典型的“互联网+”现代农业发展模式。伴随大数据、人工智能、移动互联网等技术的发展, 农业传感器、农业航空植保, 农业机器人三大前沿技术将成为主导“互联网+”现代农业发展的重要技术力量, 其发展特征将呈现集成化、专业化、网络化、实用化、普及化。结合国外在“互联网+”现代农业发展中强化政府引导、重视政府投入和法制法规建设、推进服务主体多元化和服务内容多样化以及突出产学研联合等四方面的经验, 未来我国可通过技术创新、业态创新和模式创新驱动“互联网+”现代农业发展。

来源: 农业现代化研究

更多资讯 尽在农业专业知识服务系统:<http://agri.ckcest.cn/>

发布日期:2018-03-15

全文链接:

<http://agri.ckcest.cn/file1/M00/06/68/&Csgk0FykGK6Ad3SsAB2yyn4IGU8796.pdf>

农业知识服务系统  
http://agri.ckcest.cn

更多资讯 尽在农业专业知识服务系统:<http://agri.ckcest.cn/>