



2019年第13期总180期

## 农牧业信息化专题

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1. 传感器插入装置和生物传感器

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## ▶ 前沿资讯

### 1 . Magnetoresistive sensors for near future innovative development (磁阻传感器的未来创新发展)

**简介:** 除信息记录和读取技术外, 未来15-20年, 基于磁阻原理的超敏传感器将广泛应用于创新领域。其中包括生物医学、柔性电子学、位置传感器和人机交互、各种类型的监测、导航和自动运输。一篇关于这方面的文章发表在行业期刊《IEEE Transactions on Magnetics》上。远东联邦大学(FEFU)的科学家与一个国际专家小组合作, 确定了磁阻传感器最有前途的五个应用领域。研究人员在进行了全面的分析工作后, 制定了未来15-20年传感器行业的发展路线图, 并概述了该研究领域的科学成果商业化的最可能途径。FEFU自然科学学院计算机系统系副教授Alexander Samardak表示, “磁阻传感器的特点是高灵敏度、低成本、低功耗和紧凑性。它们的属性因应用程序而异。今天, 这个行业发展迅速, 传感器灵敏度不断提高, 从研究到真正的技术出现只需要很短的时间。我们相信这种传感器有着非常广阔的应用领域。例如, 在生物医学领域, 由于超灵敏的传感器可以接收来自人体磁性器官和DNA分子的信号, 因此有可能准确地确定潜在的遗传疾病并选择最适合的治疗方法。相应的系统可能在2030年左右出现。” 科学家指出, 市场上磁阻传感器最接近的竞争对手是在霍尔效应原理下工作的传感器。(原文链接: <https://ieeexplore.ieee.org/document/8660658>)

**来源:** EurekAlert

**发布日期:**2019-03-21

**全文链接:**

[http://agri.ckcest.cn/file1/M00/06/61/Csgk0FybIJSAP9WGAAPxt\\_fKrHk850.pdf](http://agri.ckcest.cn/file1/M00/06/61/Csgk0FybIJSAP9WGAAPxt_fKrHk850.pdf)

### 2. 中国区块链及人工智能专利申请量居世界知识产权组织首位

**简介:** 根据世界知识产权评论(WIPR)网站2019年1月发布的消息称, 著名会计公司UHY Hacker Young发布的调查数据显示, 2017年中国公司是世界知识产权组织(WIPO)区块链和人工智能(AI)专利的主要申报者。2017年全球各国企业向WIPO提交了共314项区块链专利申请, 其中99项由中国企业提交; 排名第二的美国公司提交了92项区块链专利; 英国企业向WIPO申请了34项区块链专利, 居欧洲国家魁首。据UHY调查数据, 中国公司还在向WIPO提交新的AI专利申请方面处于领先地位, 在2017年向WIPO提交的649份申请中中国占473份; 美国和韩国分别提交65项和41项专利; 英国企业在2017年仅向WIPO提交了两项AI专利。

**来源:** 科技部

**发布日期:**2019-03-15

**全文链接:**

<http://agri.ckcest.cn/file1/M00/06/61/Csgk0FybIUeAZoZkAAHFxi5bloI127.pdf>

### 3. 韩国加快开通5G移动通信服务, 推动智能产业发展

**简介:** 据韩国亚洲经济报道, 在政府举行的创新成长战略会议上, 韩国副总理兼企划财政部长官洪楠基表示, “3月末全球首部5G智能手机将亮相, 届时将与国内通讯社联手开通5G移动通信服务, 提高国民生活质量。” 洪楠基表示, 5G通信是第四次工业革命的

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基础，将促进信息通信、保健医疗、制造业、运输业等多个产业的发展，今年政府将向国内三大通讯社提供3万亿韩元（约26.6亿美元）的财政支持，主要用于5G商用化基建，未来将全面开放现有金融支付网，完善快捷支付、汇款等金融服务。目前，韩国政府正在积极推动智能产业园区建设，计划到2022年建设10处智能产业园区，从而提升制造业竞争力，目前已选定昌原在内的两处智能产业园作为示范区，计划到2022年将智能产业园区扩大到10处，进一步提升制造业竞争力，今年政府将向智能产业园区建设工程拨款2000亿韩元（约1.7亿美元），在园区率先实行监管沙盒，帮助新产业和技术顺利完成测试。除此之外，政府还将加大对智能工厂、生物健康、金融科技、未来汽车、智能城市、能源产业、无人机等八大新兴产业的财政支持，今年预计向上述产业投入3.9万亿韩元（约34亿美元），同比增加78%。

来源：科技部

发布日期：2019-03-14

全文链接：

<http://agri.ckcest.cn/file1/M00/06/61/Csgk0FybIOWAXjTVAAIVYbFUd2g817.pdf>

## 学术文献

### 1 . Validation testing of an ion-specific sensing and control system for precision hydroponic macronutrient management (用于精准水培宏量营养素的离子特异性传感和控制系统的验证试验)

简介：Ion-specific nutrient management systems would replace conventional electrical conductivity-based management systems for more efficient maintenance of the concentration of each ion in nutrient solutions for closed hydroponic systems. This study reports on the validation testing of a previously developed ion-specific sensing and control system. Specific objectives were to (1) evaluate the ability of the system to maintain the target concentrations of five macronutrients, i.e.,  $\text{NO}_3^-$ ,  $\text{PO}_4^{3-}$ ,  $\text{K}^+$ ,  $\text{Ca}^{2+}$ , and  $\text{Mg}^{2+}$  ions, required for crop growth in closed hydroponic systems based on both real-time measurement of  $\text{NO}_3^-$ ,  $\text{K}^+$ , and  $\text{Ca}^{2+}$  and the use of a concentration ratio method to replenish  $\text{Mg}^{2+}$  and  $\text{PO}_4^{3-}$ , and (2) investigate the applicability of a cobalt rod-based electrode for hydroponic phosphate sensing. In a lettuce cultivation test conducted with the ebb-and-flow method over 21 days, most of the macronutrient concentrations were successfully maintained at the target levels with RMSE values of  $25.2 \pm 9.4$ ,  $19.1 \pm 8.1$ , and  $11.5 \pm 6.1 \text{ mg}\cdot\text{L}^{-1}$  for  $\text{NO}_3^-$ ,  $\text{K}^+$ , and  $\text{Ca}^{2+}$ , respectively. In the case of  $\text{Mg}^{2+}$  and  $\text{PO}_4^{3-}$  ions replenished in a proportional ratio to the supply of  $\text{Ca}^{2+}$  and  $\text{NO}_3^-$  ions, respectively, the  $\text{Mg}^{2+}$  concentrations were maintained between 18 and  $25 \text{ mg}\cdot\text{L}^{-1}$  at an almost constant level, whereas the  $\text{PO}_4^{3-}$  concentrations increased steadily over time with no clear evidence of plant uptake, implying that the use of a concentration ratio method would not be effective in controlling the concentrations of  $\text{PO}_4^{3-}$  in hydroponic solutions. As a phosphate sensor, the cobalt electrodes yielded an RMSE result of  $10.9 \pm 7.1\%$  from a comparison of the electrode method and standard analysis when tested in hydroponic lettuce samples taken once a day during the period of lettuce growing, thereby offering the potential for use in hydroponic phosphate sensing.

来源：COMPUTERS AND ELECTRONICS IN AGRICULTURE

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发布日期:2018-12-14

全文链接:

<http://agri.ckcest.cn/file1/M00/06/61/Csgk0FybHzAJJNOAB7ieugsQ1Q256.pdf>

## **2 . An impedance biosensor for simultaneous detection of low concentration of Salmonella serogroups in poultry and fresh produce samples (一种用于同时检测家禽和新鲜农产品中低浓度沙门氏菌血清群的阻抗生物传感器)**

简介: This paper reports the design, fabrication and testing of a microfluidic based impedance biosensor for rapid and simultaneous detection of three Salmonella serogroups. The microfluidic device consists of three microchannels, each one includes a region for focusing the Salmonella cells into the centerline of the microchannel and direct them toward the sensing region to obtain highly concentrated samples using positive dielectrophoresis force. A region for bacteria sensing consists of interdigitated electrode (IDE) array with 10 pairs of fingers. Three types of Salmonella antibodies (type B, D and E) were mixed separately with the cross-linker (Sulfo-LC-SPDP) to enhance the immobilization of the antibodies to the detection electrodes. The electrode surfaces was then functionalized with the three mixtures, one for each channel. As target antigen binds to the antibody, it results in impedance change. The Salmonella samples were spiked with Salmonella type B, introduced into the biosensor via the sample inlet into the focusing region, and then toward the sensing region where they bind to the immobilized antibody, causing a change in the impedance. The performance of the devices was tested using single Salmonella serotype B and two Salmonella serotypes B, and D, with a limit of detection of 7 cells/ml. The biosensor was also able to differentiate live from dead bacteria eliminating the false positive results. Finally, the device was also able to detect Salmonella selectively when other type of pathogen was present.

来源: BIOSENSORS & BIOELECTRONICS

发布日期:2018-11-01

全文链接:

<http://agri.ckcest.cn/file1/M00/06/61/Csgk0FybH 2Afep0AC1Mr6ucZs0395.pdf>

## **➤ 相关专利**

### **1 . SENSOR INSERTION DEVICE AND BIOSENSOR (传感器插入装置和生物传感器)**

简介: A sensor insertion device (44) comprises a main body case (45), a needle slider (52), a disposal slider (53), a spring (68), a puncture knob (46), and an opening mechanism (a window member (61) and a handle (63)). The needle slider (52) grips a needle (35) and a sensor (4) on a first end side, and is provided inside the main body case (45) in a state of being able to slide in the sensor insertion direction. The disposal slider (53) is provided inside the main body

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case (45) in a slidable state. The puncture knob (46) has an insertion hole (60) into which the rear end portion of the needle slider (52) can be inserted. The opening mechanism (the window member (61) and the handle (63)) puts the insertion hole (60) into a closed state when the needle slider (52) is being slid in the sensor insertion direction, and, put the insertion hole (60) in an open state in which the second end side of the needle slider (52) has been inserted into the insertion hole (60) by opening up the contact portion between the puncture knob (46) and the second end side of the needle slider (52) when the puncture operation is complete. 专利类型：发明专利；专利状态：专利权有效；申请日期：2017-04-07；公开日期：2019-03-06；申请号：EP2017789230A；公开号：EP3449827A1；申请来源：申请人直接申请（来自Incopat数据库）。

**来源：**欧洲专利局

**发布日期：**2019-03-06

**全文链接：**

<http://agri.ckcest.cn/file1/M00/06/61/Csgk0FybHkWAE9C6AFnJ2cTHmPs769.pdf>