Seminars in Biotechnology BTEC 592 & BTEC 692

"Disposable sensors for next-generation on-site testing"

Thursday, April 08, 2021 at 13:30 h
Online Seminar

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Can Dincer is currently junior research group leader at FIT and IMTEK of the University of Freiburg. The main research interest of his group "Disposable Microsystems" is the development of bioanalytical microsystems for various applications including diagnostics, especially wearables and point-of-care diagnostics, food and environmental monitoring. Having completed his studies in microsystems engineering, Can received in 2016 his Ph.D. degree with summa cum laude from the University of Freiburg. In early 2017, he has been awarded by the second place in Gips-Schüle Young Scientist Award for his dissertation. Between June 2017 – June 2019, Can also worked as a visiting researcher at the Department of Bioengineering at the Imperial College London. In September 2019, he joined the editorial team of the journal "Biosensors and Bioelectronics" as an Associate Editor. In late 2019, Can received the Adolf Martens Prize in the category "Analytical Chemistry". In September 2020, he won the Best Paper Award 2020 of iba Heiligenstadt with his publication on the first CRISPR-powered electrochemical microfluidic biosensor in "Advanced Materials". Besides, in 2020 Can is also recognized within 25 early-stage investigators advancing the field of sensor science in the Special Issue "Rising Stars in Sensing" of the journal "ACS Sensors".

Abstract

Disposable sensors are low-cost and easy-to-handle sensing devices for short-term or single-shot measurements[1]. In recent years, they have become increasingly important for various applications which includes from environmental, forensic, pharmaceutical, agricultural, and food monitoring to diagnostics, especially the point-of-care testing and wearables[1,2]. In this lecture, first a brief introduction to disposable sensors will be given. Afterwards, two different biosensing approaches for fighting pandemics will be presented: (i) A CRISPR-powered electrochemical biosensor for nucleic-acid-amplification-free detection of different RNAs simultaneously and on site[3,4], and (ii) low-cost electrochemical paper-based wearable sensors that can be integrated to any type of facemask for wearable and continuous monitoring of breath biochemistry and/or testing of the infectious diseases such as corona viruses from exhaled breath[5].

References

1. Dincer, C. *et al.* Disposable Sensors in Diagnostics, Food, and Environmental Monitoring. *Adv. Mater.* **31**, 1806739 (2019).
2. Ates, H. C. *et al.* Integrated Devices for Non-Invasive Diagnostics. *Adv. Funct. Mater.* 2010388 (2021) doi:10.1002/adfm.202010388.
3. Bruch, R. *et al.* CRISPR/Cas13a-Powered Electrochemical Microfluidic Biosensor for Nucleic Acid Amplification-Free miRNA Diagnostics. *Adv. Mater.* **31**, 1905311 (2019).
4. Bruch, R. *et al.* CRISPR-Powered Electrochemical Microfluidic Multiplexed Biosensor For Target Amplification-Free MiRNA Diagnostics. *Biosens. Bioelectron.* 112887 (2021) doi:10.1016/j.bios.2020.112887.
5. Maier, D. *et al.* Toward Continuous Monitoring of Breath Biochemistry: A Paper-Based Wearable Sensor for Real-Time Hydrogen Peroxide Measurement in Simulated Breath. *ACS Sensors* **4**, 2945–2951 (2019).