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Development of integrated electrochemical-quartz crystal microbalance biosensor arrays: Towards ultrasensitive, multiplexed and rapid point-of-care dengue detection (Conference Paper)

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Abstract

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Dengue is an infectious mosquito-borne viral disease that affects approximately 50 million people annually worldwide and is prevalent mostly in the tropics. Severe cases of dengue can be fatal, making early detection and fast diagnosis crucial towards improving patient care and survival rates. Currently, early detection can be achieved through detection of NS1 protein, using ELISA technique. Unfortunately, ELISA is an expensive method, making it unsuitable as a screening technique, especially in low-resource settings. In this work, we present a prototype device and its early validation studies, of an integrated electrochemical and mass-sensor for dengue NS1 antigen. The sensor is connected to open source mass-sensing software and hardware, OpenQCM which makes it easily portable. Having dual-measurement capabilities (mass and impedance) increases the sensitivity of the sensor. Preliminary studies suggest that the prototype could achieve ultralow limit of detection as low as 10 ng mL⁻¹, dual-sensing cross-validation capability, portable size, sample-to-analysis time of less than 30 minutes, and parallelization of multiple assays. This work could lead to early and accurate dengue detection in routine point-of-care settings. © 2019 by SCITEPRESS - Science and Technology Publications, Lda.

SciVal Topic Prominence

Topic: Dengue | Dengue Virus | dengue diagnosis

Prominence percentile: 86.133

Author keywords

- Biosensor
- Dengue
- Integrated Electrochemical-Quartz Crystal Microbalance
- Point-of-Care Diagnostics
- Sensor Arrays

Indexed keywords

- Engineering controlled terms:
- Biomedical engineering
- Biosensors
- Diagnosis
- Electronic medical equipment
- Open source software
- Open systems
- Quartz
- Quartz crystal microbalances
- Sensor arrays

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Zainuddin, A.A. , Nordin, A.N. , Ralib, A.A.M. (2018) 2017 IEEE International Conference on Smart Instrumentation, Measurement and Applications, ICSIMA 2017

Recent trends in dengue detection methods using biosensors

Zainuddin, A.A. , Nordin, A.N. , Rahim, R.A. (2018) IIUM Engineering Journal

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