

## **Development of smartphone-based electrochemical biosensor for on-site food safety testing**

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In the field of food safety testing, the standard approach requires sampling, transferring the samples to a central laboratory to be tested. The most commonly used methods are liquid chromatography combined with fluorescence detection or mass spectrometry. Although these methods are the gold standard for quantitative confirmatory analysis, they are expensive, time-consuming, and in need of trained personnel. Therefore, there has been an increasing demand for portable and handheld food analyzers to provide rapid, efficient, and on-site screening of food contaminants. The smartphone-based electrochemical biosensor is an ideal choice for a portable, handheld food analyzer considering the miniaturization capability of the device, disposable electrodes, and electronic readout. The device could be connected to the smartphone using USB or Bluetooth and a customized user-friendly App shows the result on the phone. To this end, a magnetic bead-based immunosensor was developed successfully for aflatoxin B1 detection in corn and grain samples. The magnetic beads application minimizes the matrix effect by improving the washing steps using a magnet. It also allows to control the sample flow once integrating the assay into a chip-based device. The working principle is based on indirect competitive enzyme-linked immunosorbent assay (ELISA). The limit of detection of 39 pg/mL and dynamic range of 77-621 pg/mL were achieved for detection of aflatoxin B1 in buffer. The limit of detection is lower than the EU regulatory limit for aflatoxin B1, 2 µg/kg which corresponds to 46 pg/mL after extraction. Thus, the assay is a promising candidate for on-site aflatoxin detection. This assay will be further validated based on the EU commission regulation (EU) No 519/2014 for validation of screening methods to ensure its applicability for food safety testing.

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