

Biosensor provides rapid virus field tests

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The Biosensor device Copyright : The Hong Kong Polytechnic University

Prof. Samuel Lo, Associate Head of the Department of Applied Biology and Chemical Technology, and Dr Derek Or, Associate Professor of the Department of Electrical Engineering, have jointly developed a Portable Real-time DNA Biosensor. The device is designed to perform speedy in situ DNA tests for bio-defence and health surveillance purposes in areas suspected to be contaminated with pathogens and/or undesirable microbes.

Unlike conventional laboratory tests that take at least one or two days, this hand-held, battery-operated and fully automated biosensor is built upon a novel DNA-based bio-chemo-physical conversion method. It is able to detect harmful bacteria, such as *E. coli*, salmonella and staphylococcus, on site within 30 minutes. It can be adapted to cover such deadly viruses as SARS, H5N1 flu and swine [flu viruses](#) in future. It can also be re-designed to monitor possible biological attack from anthrax, smallpox and cholera etc.

Comprising a reaction chamber, an ultrasound core and an electronics power board, the new biosensor can test for the presence of a specific pathogen in water and air samples by recognizing the existence of its DNA. When this pathogen is added to the reaction chamber, the further addition of both specific primer-linked thrombin and fibrinogen triggers an innovative molecular bio-chemical reaction. In the case of a DNA primer match, the enzyme will convert fibrinogen into a lump of visible gel that blocks the transmission of ultrasound signals through the reaction chamber. A drop in the ultrasound reading is then a strong indicator of the presence of the target pathogen in the sample.

This invention won a Gold Award at the 39th International Exhibition of Inventions in Geneva, Switzerland.

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