



# Biomedical Engineering Seminar Series

1st Semester, Academic Year 2018

Date: October 9, 2018

Time: 11.00 AM – 12.00 PM

Room 6373, 3<sup>rd</sup> level, Building 3,

Faculty of Engineering; Mahidol University



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### "Microfluidic-based Point-of-Care Testings"

Point-of-care (POC) tests can improve the management of infectious diseases and clinical outcomes, especially in resource-limited settings where health care infrastructure is weak, and access to quality and timely medical care is a challenge, by delivery appropriate and prompt diagnosis and treatments to those preventable and treatable diseases. General design constraints, for example, integration, portability, low power consumption, automation, and ruggedness are important to POC tests which microfluidics or lab-on-a-chip technology can be engineered to serve this purpose. Many POC tests have been designed for use in developed countries, and might not be readily transferable to resource-limited settings. These new technologies need to be accessible, affordable and practical to be implemented at resource-limited settings to save lives in developing countries.

The overall goal of this work is to develop microfluidic diagnostic devices which are practical and reliable for global health. To simplify user interface and reduce the cost of the diagnostic device, we integrated our microfluidic immunoassay with a smartphone interface to replace computers or high-cost processors for diagnostic devices in low-resource settings. Our low-cost (\$34), smartphone supported device for a multiplexed immunoassay detected three antibody markers from HIV, treponemal- and non-treponemal syphilis from fingerstick whole blood simultaneously in 15 minutes. This device was designed to eliminate numbers of manual steps while including a user guide on the smartphone, lyophilized secondary antibodies and anti-coagulant, pre-loading all reagents on cassette, and automatic result readout to make the device simple to use and does not require a skilled operator to perform the assay. The analytical performance of the device was evaluated in Rwanda by local health care workers. We also accessed user experiences for improvement of the device in future.

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