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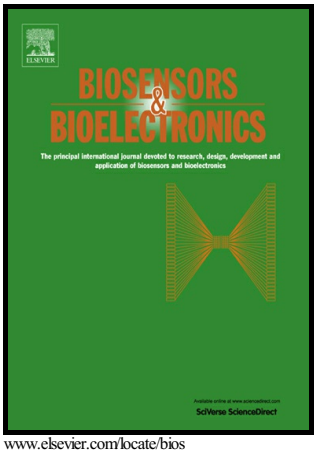

www.elsevier.com/locate/bios

PII: S0956-5663(17)30838-2
DOI: https://doi.org/10.1016/j.bios.2017.12.033
Reference: BIOS10178

To appear in: *Biosensors and Bioelectronic*

Received date: 27 July 2017
Revised date: 1 December 2017
Accepted date: 20 December 2017

Cite this article as: Arsenii Zhdanov, Jordan Keefe, Luis Franco-Waite, Karthik Raj Konnaiyan and Anna Pyayt, Mobile phone based ELISA (MELISA), *Biosensors and Bioelectronic,* https://doi.org/10.1016/j.bios.2017.12.033

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***Abstract*— Enzyme-linked immunosorbent assay (ELISA) is one of the most important technologies for biochemical analysis critical for diagnosis and monitoring of many diseases. Traditional systems for ELISA incubation and reading are expensive and bulky, thus cannot be used at point-of-care or in the field. Here, we propose and demonstrate a new miniature mobile phone based system for ELISA (MELISA). This system can be used to complete all steps of the assay, including incubation and reading. It weighs just 1 pound, can be fabricated at low cost, portable, and can transfer test results via mobile phone. We successfully demonstrated how MELISA can be calibrated for accurate measurements of progesterone and demonstrated successful measurements with the calibrated system.**

Keywords—Enzyme-Linked Immunosorbent Assay (ELISA); optical sensor; progesterone; mobile ELISA (MELISA).

I. INTRODUCTION

Recently, mobile phones have become a popular platform for developing point-of-care testing systems. The term mHeatlh has been adopted by the World Health Organization to cover medical services and practices that utilize mobile phones or other portable electronics (World Health Organization, 2011). For example, pregnancy complication monitoring can be done on a mobile phone (Archibong et al., 2017; Konnaiyan et al., 2016). Blood pressure monitoring with a mobile phone application for stroke patients is being researched (Jenkins et al., 2016), while other