Abstract

We report a microfluidic immunoassay consisting of multiple precise and efficient mixing units for transient multi-cytokine detections secreted by lymphocytes. This device has an array of detection micro-chambers with each included a Taylor dispersion-based mixing unit. The sub-pico-liter bio-samples are extracted from a cell culture and mixed with cytokine-sensitive fluorescence micro-beads, which offer fluorescent signals to quantify the bound cytokines on beads, are embedded in the chambers for quantitative detection of the target cytokines. We perform experiments to verify the mixing scheme on its robustness and sensitivity. We first calibrate labeling fluorescence intensity profiles of 6 independent cytokine-sensitive beads, each conjugated with a specific
antibody, using a confocal microscope for measuring the intensity. We demonstrate the high detection sensitivity for cytokine concentrations released by a human monocytic cell line (THP-1). We propose a highly integrated microfluidic immunoassay consisting the $4 \times 4$ independently operated detection micro-chambers, achieving high-throughput detection functionality. Altogether, further development of this device can lead to profiling of multiple cytokine dynamics of lymphocytes for deeper understandings of the human immune system as well as the immune diseases.

**Biography**

Mr. LIU is a PhD student in Department of Mechanical and Biomedical Engineering at City University of Hong Kong. He received his B.E degree (2012) in Biological Sciences at Hefei Normal University and M.S. degree (2015) in Microbiology at Hefei University of Technology. His current research interests are microfluidic techniques.

Enquiry: 3442 8420

*All are Welcome!*

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