PhD Oral Defense

Date: **3 August 2021 (Tuesday)** **Time:** **4:00 pm**

Thesis Title

Two-chip Acoustofluidics: From Manipulation of Microparticles to Integration with Micromechanical Sensing

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Abstract

Acoustic tweezers have received much attention as powerful tools to manipulate particles and cells that is contactless and label-free, with a wide applications in biomedical diagnosis, analytical chemistry and fundamental biological studies. Typical acoustic tweezers manipulate particles directly on costly SAW substrate. However, disposing of SAW devices after a single-use to prevent biological cross-contamination is not a viable solution in terms of cost. Therefore, there has been interest to develop two-chip acoustofluidic platforms comprising of a reusable SAW substrate and a disposable superstrate. This thesis describes the application of acoustofluidic techniques in a two-chip format for two different functions: (1) acoustic micro-centrifugation for particle and cell concentration and separation in a sessile droplet and (2) patterning and moving particles and cells in two orthogonal directions within a closed microchamber. This thesis aims to push the status of two-chip acoustic actuation from simple plain superstrates to more complex superstrates with multi-layer films and patterned structures that mimic generic microfabricated devices. Finally, the two-chip setup was further explored to demonstrate the integration of acoustic localization of sparse particle and miniaturized mass sensing on a single chip for enhanced detection and minimization of blank measurements.