

Exploration of integrated microfluidics and biosensing with surface acoustic wave (SAW) devices and film bulk acoustic wave resonators (FBARs) for lab-on-a-chip applications

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This project consisted of a Short Research Visit (SRV) to Prof. Andrew Flewitt's group in University of Cambridge on 2nd – 6th July 2018 aiming at learning the techniques to integrate acousto-fluidic SAW devices and FBARs based on mechanically flexible thin films. This work is essential for the microfluidic functions (e.g. movement, mixing) using thin film SAW, and also manipulation living cell inside microdroplets (also using SAW), and precision biosensing (using FBAR devices on the same platform) for medical diagnostic applications (see illustration in Fig. 1a).

During the visit, Dr. Tao was coached to use the high frequency RF probe station and the sensing system based on network analyser to obtain the frequency shift simultaneously for the liquid sensing applications. The resonant frequency of SAWs and FBARs were recorded. The FBARs based on inclined ZnO thin films were used in viscosity sensing, while the SAW devices provide multiple microfluidic functions including liquid mixing, transport, jetting and nebulization to mix target solutions and to pump the liquid to be detected to the sensing region (as shown in Fig. 1b)

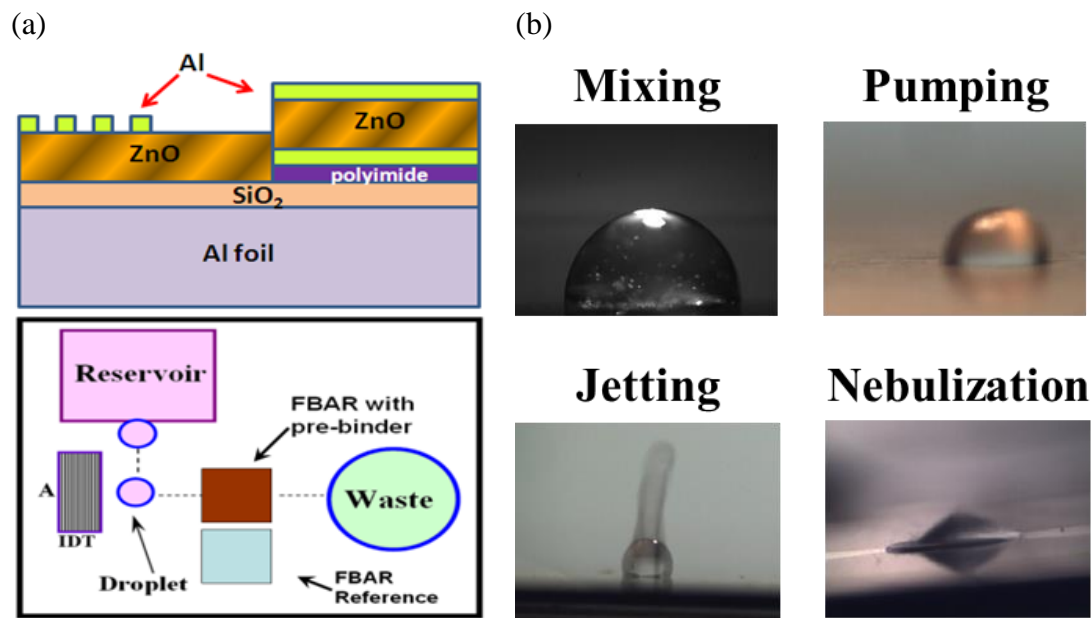


Figure 1. (a) scheme of the integration of acousto-fluidic SAW devices and FBARs for lab-on-a-chip application. (b) Liquid mixing, transport, jetting and nebulization provided by SAW devices on flexible thin films.