基于声表面波技术实现纸基微流开关研究

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摘　要：

提出了采用声表面波技术实现纸基微流开关的方法。它由127.68° 旋转Y切割X传播方向的LiNbO3压电基片和两个有一定间隙的纸微通道组成。压电基片上采用微电子工艺制作1个中心频率为27.5MHz的叉指换能器和1个反射栅，纸微流通道采用PDMS薄膜贴附于压电基片的声传播路径上，微流通道一侧微流体在没有声表面波作用时，微流体不能通过微流通道间隙，实现微流开关的“off”功能，当叉指换能器施加经功率放大器放大后的RF信号，它激发的声表面波驱动微流通道中微流体输运到另一微流通道，实现微流开关的“on”功能。红色染料溶液和亚硝酸钠溶液在纸微流通道输运实验表明，声表面波可实现纸微流通道内微流体的开关功能。

关键词：微流开关；声表面波；叉指换能器；微通道

Study on Paper Based Micro-fluidic switch Based on Surface Acoustic Wave

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Abstract:

A paper based micro-fluidic switch has been implemented using surface acoustic wave. It is comprised of a 127.68° yx-LiNbO3 substrate and two paper micro-channels within small spaces. An interdigital transducer with 27.5MHz center frequency and a reflector were fabricated on the piezoelectric substrate, and the paper micro-channels were stick on the piezoelectric substrate by PDMS film. Micro-fluids could not pass through the small spaces of the two paper micro-channels without SAW, which is “off” of the switch. However, the micro-fluids could pass through the small spaces by the helping of SAW excited by the interdigital transducer, when an amplified RF signal is added on the interdigital transducer. Experiment results of red dye solutions and NaNO2 solutions show that paper micro-fluidic switch can be implemented by the helping of SAW.

Keywords: Micro-fluidic switch; Surface acoustic wave; Interdigital transducer; Micro-channel

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