Supplementary Material (ESI) for Lab on a Chip

SAW Excitation and Detection

IDTs and delay lines are individually characterized in order to determine SAW resonance frequency and insertion loss. To this end, the scattering parameters S11, S12 (S21) and S22 are measured by an Agilent E5071C vector network analyzer.

SAWs are excited by applying the appropriate resonance RF field to the selected IDT. This signal is generated by an Agilent N5181A signal generator and amplified by a Minicircuit ZHL-5W-1 power amplifier (46.4 dB gain at 90 MHz < f < 110 MHz, where f is the input signal frequency). In the case of simultaneous SAW excitation, different signal generators and amplifiers are used.

The microfluidic chips are mounted on dedicated sample holders equipped with coplanar waveguides and SMC coaxial connectors. The waveguide geometry is designed to have 50 W impedance at SAW resonance frequency.

Video Acquisition and Analysis

The fluid flow is monitored by a Leica MZ16 stereomicroscope coupled to a Basler A602f-2 CMOS camera (400 frames/ s at 640 × 120 pixel resolution). The signal from the camera is acquired by a direct hard-disk writing system specifically developed by Advanced Technologies for long time recording. Video post-processing is carried out by Virtual Dub (www.virtualdub.org) and ImageJ (National Institute of Health, USA) software.