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TRANSISTOR-BASED MICROFLUIDICS

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In microfluidics a variety of different platform technologies have emerged facilitating the most different physical effects for small volume manipulation of fluids. The performance of microfluidic devices is now sufficient to satisfy the most of applications. Nevertheless, the microfluidics lacks functional scaling as base of a steady flow of innovations as known from microelectronics described by Moore's law. The successful demonstration of pneumatic basic logic circuits raises expectations that we have access to flexible toolboxes in the near future finally leading to the start of the real second breath of microfluidics [1].

Here, we present a second concept of the logic microfluidics. It bases on components with chemical decision functionality: the chemofluidic switches [2] and transistors [3]. The circuits are controlled by chemical feedback and driven by the chemical energy of the process fluid. We developed a complete set of basic instructions including the combinatorial logic gates AND, OR, NOT and their negated counter parts as well as more sophisticated circuits like an RS flip-flop [4]. Following the electronic paradigm we also show the implementation of a chemo-fluidic oscillator circuit [5]. In principle by using these basic logic gates each more complex function can be realized.

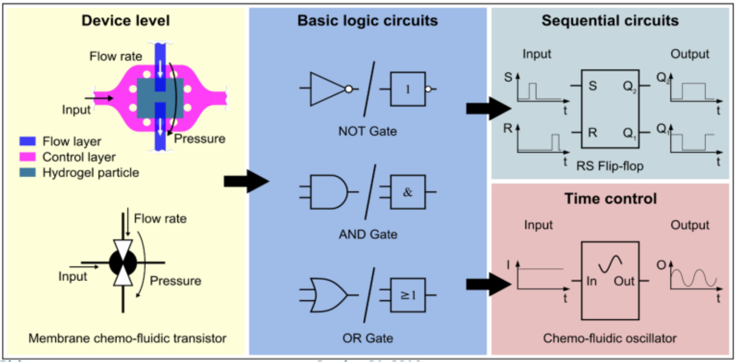

Figure 1: Set of basic circuits based on the chemofluidic membrane transistor [4].

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