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Disposable electrolytic hydraulic microfluidic pump (EHMFP) for point-of-care pathogenic detection system ALHAJI CHERIF, Cornell University, SCOTT STELICK, Illuminaria, LLC USA, NATHANIEL C. CADY, SUNY at Albany, CARL A. BATT, Cornell University — We report an electrolytic hydraulic pump consisting of electrolytic, hydraulic and fluidic chambers. We present a novel prototype and optimized microfluidic pumps that separate the hydraulic fluid from the carrier fluid and are capable of producing high pressure (7-16psi) with low power consumption (10-72mW), low current (2-11mA) and voltage requirements (5-12V). A lithographically fabricated poly(dimenthylsiloxane) pump was created which can be easily integrated into μ-TAS devices. We examined the pumps fabricated with 1:1 and 1:2 fluidic-hydraulic chamber ratio, and observed a consistent flow rate versus voltage. For the range of 5-12V, flow rates of 8-27μl/min and 7-30μl/min were measured for 1:1 and 1:2 designs (max. volume of 150-300μl). Optimum results were obtained for 1:1 design for both prototype and optimized devices under the application of 9V with rates of 17μl/min and 21μl/min, respectively. The flow rate of the optimized 1:1 design is within that of $\sim$23μl/min (SD 3.85) of the prototype 1:2 design. Armed with the improved device design, the effect of concentration of the electrolyte, rate of electrolysis, and electrode choice on the flow rate of the pumping fluid can be explored.

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