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A thermopneumatic-actuated PDMS microfluidic system integrated with micropump amd microvalve JONG-CHUL YOO, MIN-CHUL MOON, Dept. of Electrical Engineering, Myongji University, C. J. KANG, Dept.of Physics, Myongji University, YONG-SANG KIM, Dept. of Electrical Engineering, Myongji University — We developed microfluidic devices integrated with microvalves and micropumps which is essential to develop a lab-on-a-chip. The advantage of the proposed device includes low cost fabrication process and the optical transparency using PDMS and ITO glass. Also the proposed micropump has the same fabrication process and substrate with the in-channel structured microvalve. The flow rate of the microvalve is proportional to the channel width, however, the power needed to close the microvalve is around 100 mW which is almost the same regardless of the channel width. The flow rate can be well controlled by ON/OFF switching function of the ITO heater and the closing and the opening times are around 20 sec and 25 sec, respectively. The pumping rate of the micropump increases linearly as the applied pulse voltage to the ITO heater increases. The maximum pump rate of 78 nl/min was obtained at the applied frequency of 6 Hz and duty ratio of 10 %. The characteristics of microfluidic devices integrated with microvalve and micropump will be optimized.

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