

# Design and fabrication of piezoelectric actuated micropump with check - valved

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## ABSTRACT

This paper aims to present the design, fabrication and test of a novel piezoelectrically actuated, check-valves embedded micropump having the advantages of miniature size, light weight and low power consumption. The micropump consists of a piezoelectric actuator, a stainless steel chamber plate with membrane, an acrylic channel plate with two valve seats, and two cantilever-type PDMS-made check valves. This device is designed to pump gases and liquids with the capability of performing the self-priming and bubble-tolerant work mode by maximizing the stroke volume of the membrane as well as the compression ratio via minimization of the dead volume of the micropump chamber and channel. The performance of the micropump is substantially affected by the thicknesses of check valves and piezoelectric membrane, volumes of chamber and channel, and voltage/frequency of power supply applied to the piezoelectric material. The experimental data successfully demonstrate the resultant flow rate of the micropump up to 68ml/min for water and 196.8ml/min for air, respectively, driven at the sinusoidal waveform of 160Vpp.

Keywords : Piezoelectric、Actuator、PDMS、Check valve

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