*Sensors and Materials,* Vol. 22, No. 2 (2010) 85–100
MYU Tokyo

S & M 0791

# Innovative Composite PDMS Micropump with Electromagnetic Drive

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(Received March 11, 2009; accepted August 18, 2009)

***Key words:*** composite, PDMS, valveless, micropump, iron particle, electromagnetic

In this paper, an innovative composite poly-dimethylsiloxane (PDMS) micropump with an electromagnetic drive for biomedical applications that feature low cost and simple assembly is investigated. The developed PDMS micropump based on a reciprocation principle was driven by electromagnetic force that causes cavitation inside a chamber to make fluid flow. A composite PDMS thin film, an iron-particle-dispersed PDMS (IPDP) thin film, is designed, fabricated and driven by electromagnetic force to actuate the micropump. In this work, there are two categories of micropumps including stacked and inlaid types, and each category has four types of micropumps with different geometrical combinations of IPDP and PDMS thin films. The results show that inlaid-type micropumps all have higher flow rates than stacked-type micropumps, and for an inlaid-type-I micropump, the largest IPDP thin film area results in its highest flow rate among the categories. The inlaid-type-I micropump has a maximum flow rate and a backpressure of 1.623 ml/min and 361.84 Pa, respectively, when applying 30 V between 6 and 7 Hz with a low power consumption of 33 mW. As a result of its higher flow rate and new IPDP thin-film design, this kind of full PDMS micropump is appropriate for biomedical applications.

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