A novel application of ferro fluid actuation with PDMS microchannel

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Abstract: Ferrofluid is usually used as actuation medium in micropump or microvalve where most microchannels were fabricated with PMMA or silicon. The manufacturing is timeconsuming and costly. In this paper, we present a novel microchip design based on the magnetic actuation of ferrofluid. The device contains plugs and pistons formed by a ferrofluid which is actuated by an external NdFeB permanent magnet. The ferrofluid used for this application is a colloidal suspension of nanosize Fe3O4 particles in a carrier fluid that is mixed with silicone oil and hexane. The microchannel was fabricated by Poly (dimethylsiloxane) (PDMS) with four reaction zones. The experimental result shows that the ferrofluidic actuation of fluid in the PDMS microchannel was feasible. However, leakage and swelling in the PDMS microchannel might lead to fluid actuation problems. The result also reveals that it has potential application in biochip.

Author Keywords: Ferrofluid; Microchip; Micropump; PDMS channel; Protein chip

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