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Magnetically Actuated Cilia for Microfluidic Manipulation SRINIVAS HANASOGE, DREW OWEN, MATT BALLARD, PETER J HESKETH, ALEXANDER ALEXEEV, Georgia Institute of Technology, WOODRUFF SCHOOL OF MECHANICAL ENGINEERING COLLABORATION, PETIT INSTITUTE FOR BIOENGINEERING AND BIOSCIENCES COLLABORATION — We demonstrate magnetic micro-cilia based microfluidic mixing and capture techniques. For this, we use a simple and easy to fabricate high aspect ratio cilia, which are actuated magnetically. These micro-features are fabricated by evaporating NiFe alloy at room temperature, on to patterned photoresist. The evaporated alloy curls upwards when the seed layer is removed to release the cilia, thus making a free standing 'C' shaped magnetic microstructure. This is actuated using an external electromagnet or a rotating magnet. The artificial cilia can be actuated upto 20Hz. We demonstrate the active mixing these cilia can produce in the microchannel. Also, we demonstrate the capture of target species in a sample using these fast oscillating cilia. The surface of the cilia is functionalized by streptavidin which binds to biotin labelled fluorescent microspheres and mimic the capture of bacteria. We show very high capture efficiencies by using these methods. These simple to fabricate micro cilia can easily be incorporated into many microfluidic systems which require high mixing and capture efficiencies.

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