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Diamagnetic Cell Focusing in Ferrofluid Microchannel Flows JIAN ZENG, LITAO LIANG, TZUEN-RONG TZENG, XIANGCHUN XUAN, Clemson University — Focusing cells into a tight stream is usually a necessary step prior to counting, detecting, and sorting them. It has been achieved by using either sheath flow(s) to pinch the cellular stream or force(s) to manipulate the suspended cells directly. In this talk we present a three-dimensional magnetic cell focusing method in ferrofluid flow through a rectangular microchannel. A pair of facing permanent magnets is embedded into the chip to create a magnetic field null inside the microchannel. Diamagnetic cells experience negative magnetophoresis in a more magnetizable ferrofluid and thus migrate toward the centerline of the bottom channel wall. The effects of flow rate and ferrofluid concentration on the magnetic focusing of yeast cells in both the horizontal and the vertical planes of the microchannel are examined experimentally. The obtained results are compared with the theoretical predictions of an analytical model.

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