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Experimental study on biological mixing by micro-organism JIHOON KIM, YONGHEE JANG, DOYOUNG BYUN¹, Konkuk University, SUNGWON NAM, SUNGSU PARK, Ewha University, MINJUN KIM, Drexel University — Recently, the most challenge in a microfluidic device remains in acting on the device without external source such as syringe pump, magnetic driven force, and electrohydrodynamic force. Instead of the artificial external force, biological propelled mechanism has been paid much attention. Most of micro-organisms have shown to generate straight motion, vibration, and rolling motion. Those motions can be applied to numerous part of micro-actuator or biological robot. In this paper, we investigated the flow field induced by swimming Tetrahymena and suggest this for mixing mechanism. Using micro-particle image velocimetry system, we visualized dynamic motions by DC, AC, and AC+DC galvanotaxis. Due to the periodic signal of AC voltage, Tetrahymena swimming is easily controlled on any desired direction. AC galvanotaxis also allows it to stop at a position only by changing the applied frequency and voltage. Therefore, this galvanotactic motion control can be applied to biological micro-mixer in the microfluidic device.

¹Corresponding Author

Jihoon Kim
Konkuk University

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