

Fast-growing microalgae screening microfluidic device based on difference in microalgal cell densities using magnetic field

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Microalgae, unicellular photosynthetic organisms, have received great attention for biological conversion of CO₂ into valuable products. For the commercial use of microalgae, it is necessary to screening of strains for enhanced biomass productivity. To isolate the microalga strains with high growth, we developed density-based magnetophoretic separation system of cell-containing microdroplets. When the magnetic field was applied to droplets in the perpendicular direction of flow, magnetic droplets could be attracted toward the magnet having different acceleration. Consequently, the 91.90% of empty, 87.12% of low, and 90.66% of high density droplets could pass through the outlet 1, 2, and 3, respectively using expanded microchannel with stepwise increase of expansion angle. These results demonstrated three different densities of microdroplets can be separated with high efficiency using magnetic force.