Abstract Submitted
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Continuous-flow separation of live and dead yeasts using reservoir-based dielectrophoresis (rDEP)[1] SAURIN PATEL, DANIEL SHOWERS, PALLAVI VEDANTAM, TZUEN-RONG TZENG, Clemson University, SHIZHI QIAN, Old Dominion University, XIANGCHUN XUAN, Clemson University — Separating live and dead cells is critical to the diagnosis of early stage diseases and to the efficacy test of drug screening etc. We develop a novel microfluidic approach to continuous separation of yeast cells by viability inside a reservoir. It exploits the cell dielectrophoresis that is induced by the inherent electric field gradient at the reservoir-microchannel junction to selectively trap dead yeasts and continuously sort them from live ones. We term this approach reservoir-based dielectrophoresis (rDEP). The transporting, focusing, and trapping of live and dead yeast cells at the reservoir-microchannel junction are studied separately by varying the DC-biased AC electric fields. These phenomena can all be reasonably predicted by a 2D numerical model. We find that the AC to DC field ratio for live yeast trapping is higher than that for dead cells because the former experiences a weaker rDEP while having a larger electrokinetic mobility. It is this difference in the AC to DC field ratio that enables the viability-based yeast cell separation. The rDEP approach has unique advantages over existing DEP-based techniques such as the occupation of zero channel space and the elimination of in-channel mechanical or electrical parts.

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