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Dielectrophoretic Separation of Live and Dead Yeast Cells in Microfluidic Reservoirs DANIEL SHOWERS, VINCENT BROWN, LITAO LIANG, TZUEN-RONG J. TZENG, XIANGCHUN XUAN, Clemson University —
Insulator-based dielectrophoresis (iDEP) is an emerging technology that has been widely used to manipulate particles and cells in microfluidic devices. Current iDEP devices use in-channel micro-obstacles such as hurdles, posts and ridges to create electric field fields, which may cause potential Joule heating problem due to the locally amplified electric field. In this talk we present a dielectrophoretic separation method in microfluidic reservoirs. Due to the significant size mismatch between a microchannel and its end-channel reservoirs, electric fields gradients are inherently produced at the microchannel-reservoir junction. The induced dielectrophoresis can be utilized to focus and trap cells and particles. We demonstrate a continuous concentration and a selective isolation of live yeast cells from dead yeast cells in a reservoir under DC-offset AC electric fields. The effects of AC to DC field ratio and AC field frequency on the separation performance are both examined. We also develop a numerical model to understand and predict the observed cell motions in microfluidic reservoirs.

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