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Lift-enhanced Electrical Pinched Flow Fractionation for Particle and Cell Separation.[1] CORY THOMAS, ANDREW TODD, XINYU LU, XIANGCHUN XUAN, Clemson University — Pinched flow fractionation (PFF) is a microfluidic technique that utilizes the laminar flow profile in microchannels to continuously separate particles or cells by size. The flow can be either pressure-driven or electric field-driven. We demonstrate in this work that the wall-induced electrical lift force can be exploited to significantly increase the particle or cell displacement in electrical PFF due to its strong size dependence. This enhanced particle and cell separation is implemented by a simple elongation of the pinched segment in electrical PFF. It is demonstrated through both a binary and a ternary separation of polymer particles and biological cells based on surface charge and/or size. We also develop a numerical model to predict and understand this lift-enhanced electrical PFF.

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