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Electrokinetic filtration and separation of particles by size in single-spiral microchannels. JOHN DUBOSE, NATHANIEL TUPPER, JOHN STONAKER, SAURIN PATEL, XIANGCHUN XUAN, Clemson University — In this talk we demonstrate the utility of single-spiral microchannels for the continuous filtration and separation of particles by size. The negative dielectrophoretic force used in manipulating particle trajectories arises from the continual non-uniformity of the imposed electric field within the curved channel. When subjected to an externally imposed direct current power supply to electrokinetically drive the flow, 5, 10, and 15 micrometer polystyrene beads in 1 mM phosphate buffer solutions are independently focused. The various experimentally determined voltages needed for complete particle focusing differ depending upon the diameter of the separate particle species, which allows for the possibility of the continuous filtration and separation of binary particle mixtures at the outlet of the single-spiral microchannel. We also demonstrate an effective separation of a ternary particle mixture by size in a single-spiral microchannel with multiple outlet reservoirs.

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