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Electrokinetic particle motions in non-Newtonian fluids through a microchannel contraction XINYU LU, Clemson University, SANG-WOO JOO, Yeungnam University, SHIZHI QIAN, Old Dominion University, XIANGCHUN XUAN, Clemson University — Electrokinetic flow is a powerful means to transport and control fluids and particles in microfluidic devices. To date, however, nearly all previous studies have used aqueous buffer solutions that are Newtonian fluids. We present our recent experimental results of the electrokinetic particle motions in a phosphate buffer with (which is a non-Newtonian fluid) and without (which is a Newtonian fluid) the addition of polyethylene oxide (PEO) through a planar contraction-expansion microchannel. We find that the viscoelasticity of the PEO solution can cause a particle bouncing phenomenon in the contraction, which has never been observed in Newtonian fluids. The effects of electric field, particle size, PEO concentration, and buffer concentration on this electrokinetic particle instability are experimentally examined.

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