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Transport and separation of micron sized particles at isotachophoresis zone boundaries STEFFEN HARDT, GABRIELE GOET, TOBIAS BAIER, Institute for Nano- and Microfluidics, Center of Smart Interfaces, TU Darmstadt — Conventionally, isotachophoresis (ITP) is used for the separation of ionic samples according to their electrophoretic mobilities. At the zone boundaries large gradients in concentration and electric field occur. These gradients may be utilized to transport and separate small particles, as we demonstrate experimentally. We show that polymer beads of 5 micron diameter dispersed in a high mobility leading electrolyte are picked up and carried along by an ITP zone boundary that is formed between a low mobility trailing electrolyte and the leading electrolyte. Additionally, it is shown that different types of beads can be separated in that way. In particular, beads of 1 micron diameter are not carried along by the transition zone, so that a separation from 5 micron sized beads is feasible. We have identified two different effects that contribute to the force acting on the particles. Firstly, there is an electric dipole force due to the electric field gradient, secondly, a electro-hydrostatic force is generated that induces a pressure gradient. Therefore, the resulting protocol for particle separation bears some resemblance with dielectrophoresis that also utilizes electric dipole forces. An apparent advantage of our technique over dielectrophoresis lies in the fact that no microstructured electrodes or other types of microstructures are needed to create the electric field gradient.

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