

On-chip diamagnetic repulsion in continuous flow

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Abstract. We explore the potential of a microfluidic continuous flow particle separation system based on the repulsion of diamagnetic materials from a high magnetic field. Diamagnetic polystyrene particles in paramagnetic manganese (II) chloride solution were pumped into a microfluidic chamber and their deflection behaviour in a high magnetic field applied by a superconducting magnet was investigated. Two particle sizes (5 and 10 μm) were examined in two concentrations of MnCl_2 (6 and 10%). The larger particles were repelled to a greater extent than the smaller ones, and the effect was greatly enhanced when the particles were suspended in a higher concentration of MnCl_2 . These findings indicate that the system could be viable for the separation of materials of differing size and/or diamagnetic susceptibility, and as such could be suitable for the separation and sorting of small biological species for subsequent studies.

Keywords: diamagnetic repulsion, continuous flow, microfluidic, microparticles, superconducting magnet

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