**Electronic Supplementary Information (ESI) for Lab on a Chip**

**Measuring magnetic susceptibility of subtle paramagnetic solution using diamagnetic repulsion of polymer microparticles**

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**SUPPLEMENTARY FIGURE LEGENDS**

**Fig. S1** Theoretical prediction of the magnetic flux density gradients implemented by the FEMM modeling. All physical parameters of the materials were provided by the FEMM software. (e.g. magnets material: NdFeB magnets with 52 grade MGOe, surrounding material: air) (a) Theoretical prediction of the magnetic flux density gradients around the Halbach magnetic array (top) and the conventional alternating magnetic array (bottom). (b) the magnetic flux density gradients were plotted using the simulation results obtained from panel (a).

**Fig. S2** The diamagnetic repelling velocity of the PS particles suspended in the MNP solution at the concentrations of 0.01 mg/mL, 0.05 mg/mL, 0.1 mg/mL, 0.2 mg/mL, 0.5 mg/mL, 0.7 mg/mL (clear circles with error bars) were plotted, which corresponded with the theoretically predicted repelling velocities (dotted line) in the concentration range of 0.01 mg/mL to 5.0 mg/mL.
Fig. S3 The M/H curves of the paramagnetic solutions (MNP and Gd-DTPA) at each concentration were presented. The magnetization gradients refer to differential magnetic susceptibility and the peak susceptibility was shown in Fig. 4.
Figure S2
Figure S3

(a) DC moment (emu) vs. magnetic field (T) for different concentrations: 5 mg/ml, 4 mg/ml, 3 mg/ml, 1 mg/ml, and 0.2 mg/ml.

(b) DC moment (emu) vs. magnetic field (T) for different concentrations: 150 mM, 100 mM, and 50 mM.