Electronic Supplementary Material (ESI) for Analyst

Supplementary File

Brownian Motion-Magnetophoresis of Nano/Micro-Particles

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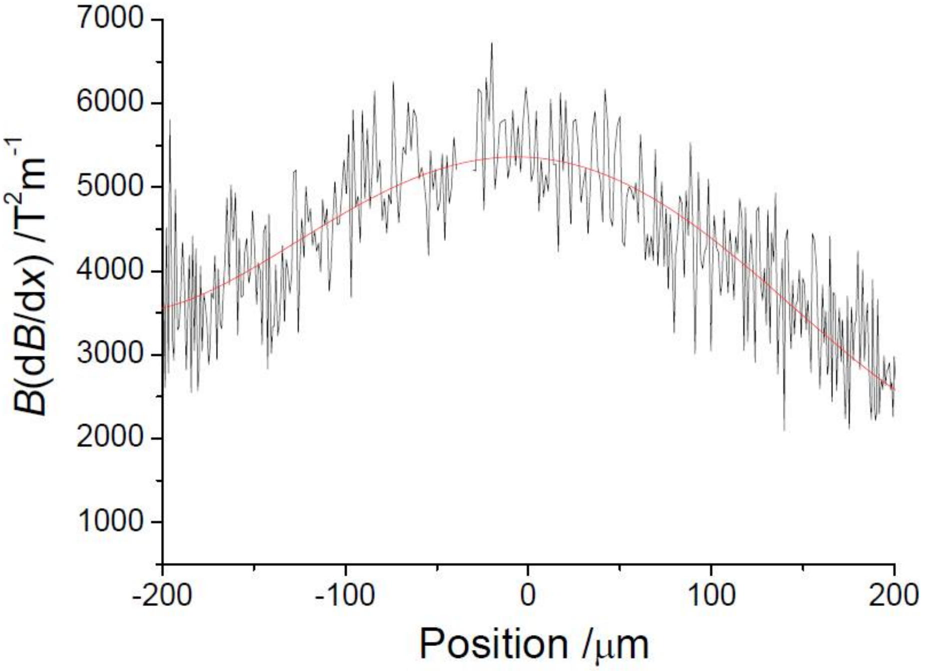

Fig. SF-1 Magnetic field gradient near the pole piece of the magnetic circuit (2.7 T) in Fig. 1 in the text. The magnetic field gradient was measured by the magnetophoretic velocity change of a 3 µm polystyrene particle (χ_p = - 8.21 x 10^{-6}) in 0.5M $MnCl_2$ solution (χ_f = 0.82 x 10^{-4}). The position of x = 0 was set at the edge of the pole piece, where the value of B(dB/dx) took maximum. The maximum value of B(dB/dx) was − 5,180 T^2m^{-1} at x = 0. The red curve is the fitted one for the fluctuation of the velocity.

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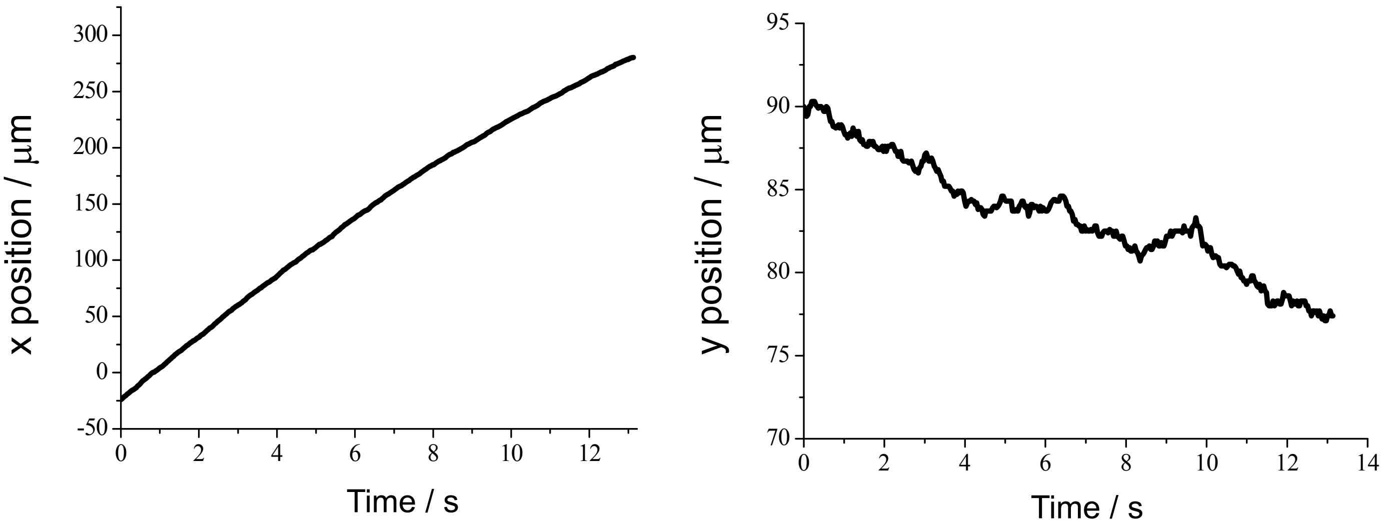

Fig. SF-2 Analysis of the Brownian motion magnetophoresis of a 500 nm polystyrene particle near the edge of pole piece, which was shown in Fig. 2(a) in the text. (a) The x position of the particle as a function of time. The slope of this curve gave the velocity for x direction. The velocity from this curve was about 20 µm/s. (b) The change of y position as a function of time, which showing the random walk of the particle on y direction. The continuous shift of the position during 13 s refers to the slow magnetophoresis to the y direction. The histogram of the Brownian motion (Fig. 2(b) in the text) was obtained by measuring successive displacement of the particle for every 330 ms.

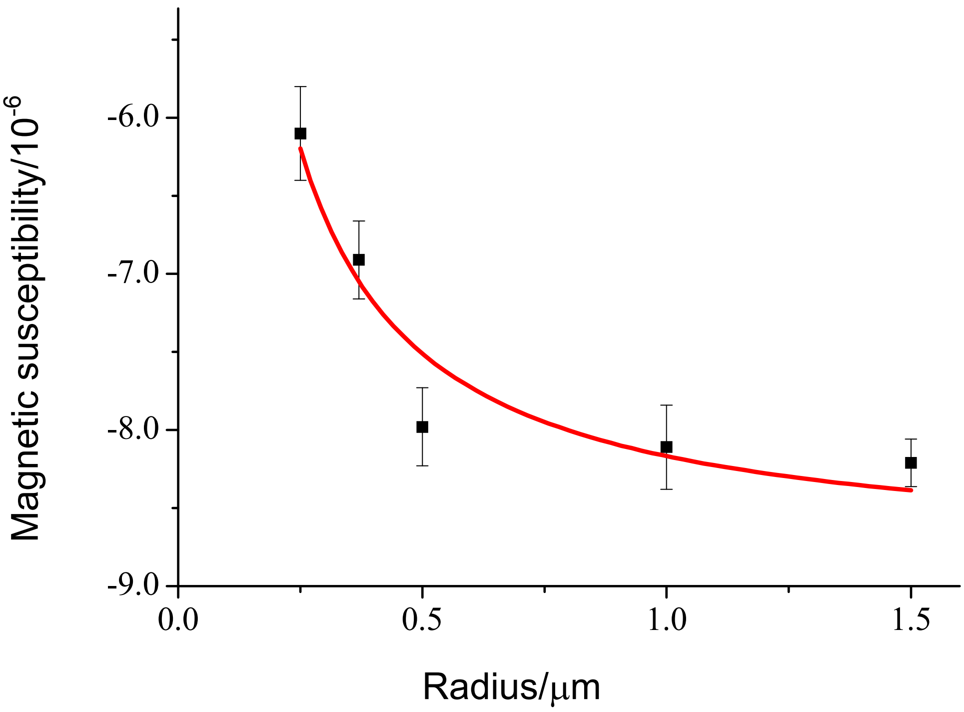

Fig. SF-3 Relationship between the magnetic susceptibility determined from the velocity and the radius for the polystyrene particles determined by the Brownian motion method. The plots were fitted with the equation (4) and the two parameters were obtained as the bulk magnetic susceptibility, $\chi_b = -(8.82 \pm 0.27) \times 10^{-6}$, and the interfacial magnetic susceptibility, $\chi_i = (0.21 \pm 0.03) \times 10^{-12}$ m^{-1}.