Cover Sheet for Supporting Information (SI) (ES060018v)

Title: Deposition of Magnetic Nanoparticles Suspended in the Gas Phase on a Specific Target Area

Authors: Myoseon Jang* and Gang Cao
Department of Environmental Sciences and Engineering
CB# 7431, Rosenau Hall, The University of North Carolina at Chapel Hill
Chapel Hill, North Carolina, 27599

Number of Tables: 1
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Table 2. Experimental conditions used for targeting magnetic nanoparticles in the sampling system with horizontal air streams [a].

exp. date	MNP V_0	flow rate	duration	[b] $Mass_{\text{filter,flow}}$ (mass on filter)	[c] $Mass_{SMPS,flow}$ (average mass by SMPS)	[d] $Mass_{pre,flow}$ (average mass by theory)	[e] deviation SMPS vs. theory	[f] deviation filter vs. SMPS	[g] deviation filter vs. theory
mm/dd/yy	(nm^3/cm^3)	(L/min)	(min)	(mg)	(mg)	(mg)	(%)	(%)	(%)
12/28/2004a	2.09E+11	0.3	60	19	7.96	7.46	-6.28	-58.11	-60.74
12/28/2004b	4.08E+11	0.3	60	10	13.03	16.12	23.71	30.30	61.20
12/28/2004c	4.11E+11	0.3	60	26	15.32	16.19	5.68	-41.08	-37.73
12/29/2004a	2.13E+11	0.3	60	16	8.61	8.87	3.02	-46.19	-44.56
12/29/2004b	5.39E+11	0.3	30	6	8.17	10.29	25.95	36.17	71.50
12/29/2004c	[h] 3.15E+11	1.0	60	15	[h] 19.21	15.92	-17.13	28.07	6.13
12/29/2004d	[h] 1.71E+11	1.0	60	11	[h] 9.25	8.80	-4.86	-15.91	-20.00
12/30/2004a	[h] 9.58E+10	1.0	60	4	[h] 4.57	5.08	11.16	14.25	27.00
12/30/2004b	[h] 6.10E+11	1.0	66	21	[h] 25.83	35.15	36.08	23.00	67.38
12/30/2004c	[h] 5.02E+11	1.0	60	17	[h] 22.84	30.70	36.57	32.24	80.59
12/31/2004a	[h] 4.97E+11	1.0	60	25	[h] 27.0	26.62	-1.41	8.00	6.48

[a] M_I = 1.23 tesla, R_M = 0.953 cm, and L_M = 0.953 cm (see equation 6). [b] The error for the collected mass on the filter is ± 3μg. [c] $Mass_{SMPS,flow}$ is estimated from SMPS data between upstream and downstream of a device, and averaged for the duration of sampling time. [d] The theoretical mass ($Mass_{pre,flow}$) was calculated using equation 24. [e] The deviation of the theoretical calculation from the mass by SMPS is estimated by ($Mass_{pre,flow}$ - $Mass_{SMPS,flow}$)/$Mass_{SMPS,flow}$. [f] The deviation of the SMPS mass from the filter mass is estimated by ($Mass_{SMPS,flow}$ - $Mass_{\text{filter,flow}}$)/$Mass_{\text{filter,flow}}$. [g] The deviation of the theoretical calculation from the filter mass is estimated by ($Mass_{pre,flow}$ - $Mass_{\text{filter,flow}}$)/$Mass_{\text{filter,flow}}$. [h] The R^2 of the linear regression between MNP V_0 and $Mass_{SMPS,flow}$ is 0.92.

Figure S1. Setup for the targeting device of magnetic nanoparticles in the flow system.

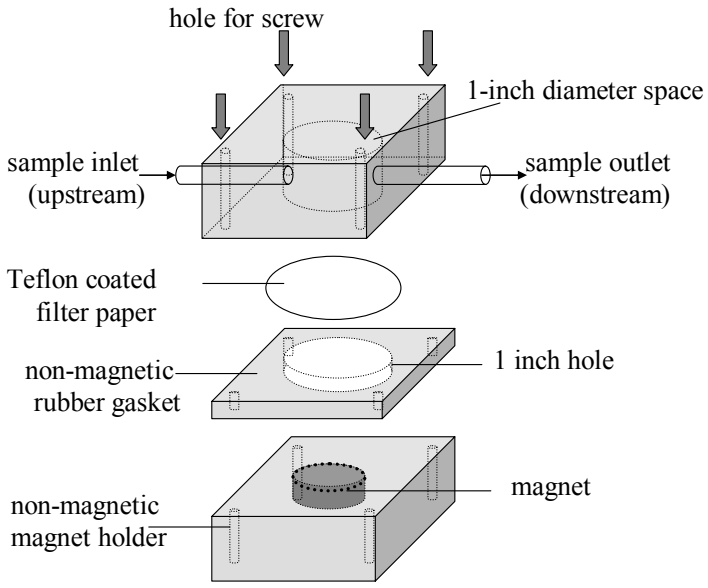


Figure S2. Magnetic dipole-dipole interaction of particles. D_p is the particle diameter and r is the distance between two particles.

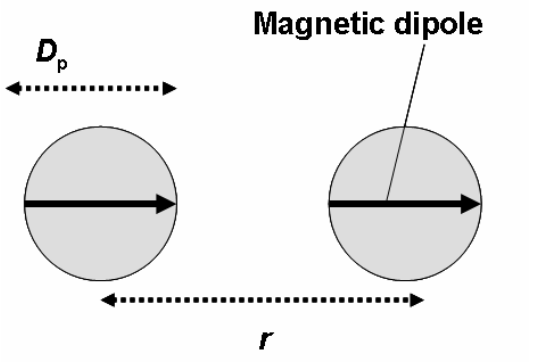
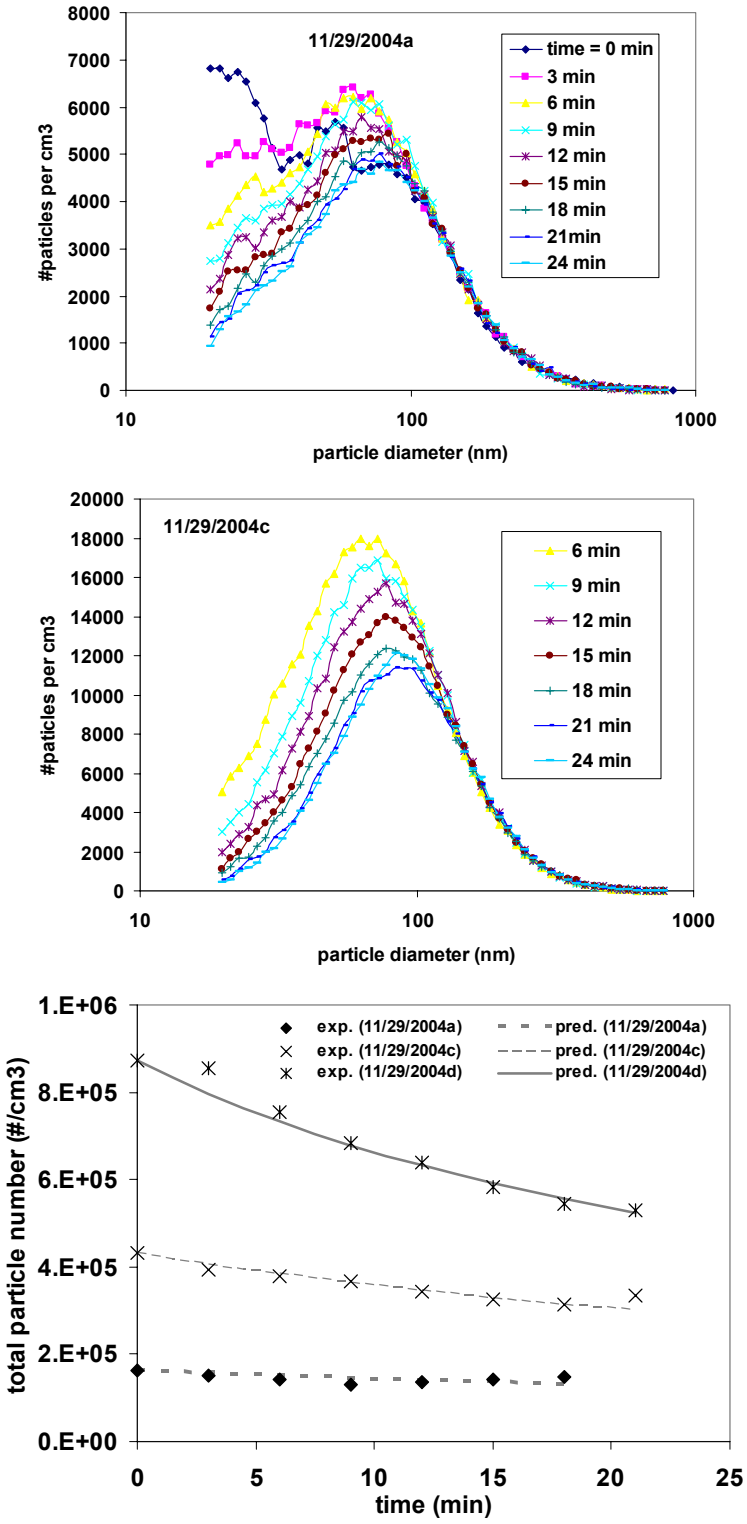


Figure S3. Time profile of the MNP distribution for two different initial MNP concentrations in the chamber and the time profiles of the observed total number concentration of MNP in three different initial MNP concentration along with the semiempirical prediction using equation 8 and Table 1.



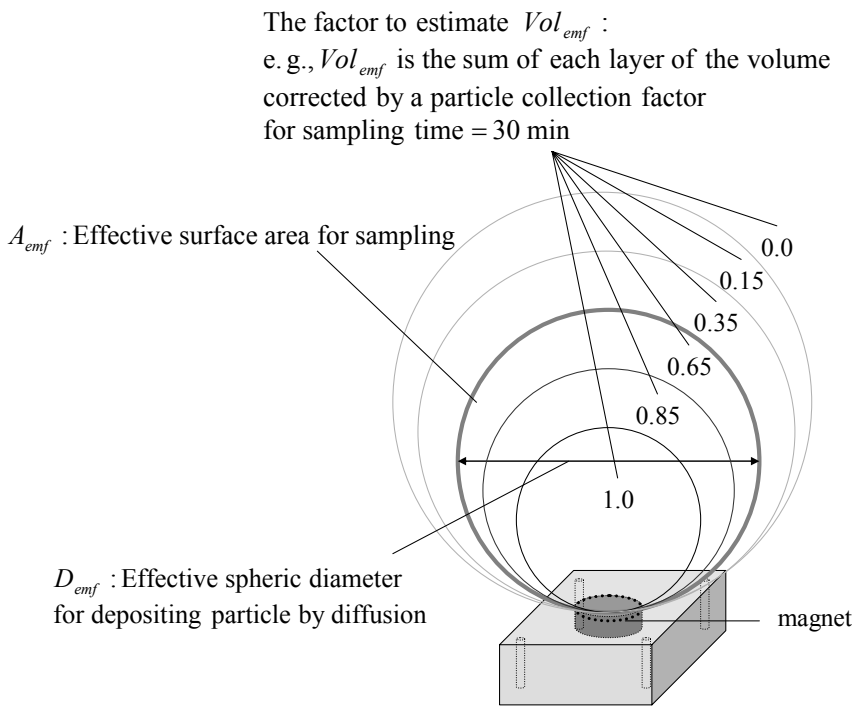


Figure S4. The deposition of magnetic particle in the stagnant air system.

When the magnetic particles are placed within a short distance, most magnetic particles can be collected on the target area (factor = 1.0 within a bin of spherical volume). The available particles to deposit on the target area decrease as the distance from a magnet increases and the sampling time decreases. These available particles in a given condition also vary with a particle size. For example, the chance to deposit smaller particles drops, as the distance increases.