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Supplement of

Effect of thermodenuding on the structure of nascent flame soot aggregates

Bhandari et al.

1. Calculation of coating thickness:

In our calculation of coating thickness, we assume material density values of 1.8 and 1.3 for BC and organic coating materials present in nascent soot. The material density values are the values used by Slowik et al. [1] for black carbon and flame generated PAHs respectively. The masses of nascent soot particle measured before and after thermodenuding were then used to get the mass fraction of BC and organic coating. For the case of maximum mass loss (~29% mass loss) for a sample from BC2 (see Table 1), we have mass of nascent soot as 1.52 fg that reduced to 1.08 fg after thermodenuding. Using the mass (M) and density (ϱ) relation in term of volume equivalent radius (r_{ve}) as M/ϱ = (4/3).π.r_{ve}^3, we calculated the coating thickness of coating material using equation III. In eq. (I), M_{BC} is the masses of BC in soot after thermodenuding and M_{coat} is the mass of material that has been removed from the soot after thermodenuding. R_{ve} and r_{ve} are the radius of volume equivalent soot before and after thermodenuding. ϱ_{BC} and ϱ_{coat} are the material density of soot and coating materials present on soot.

$$\Delta R_{ve} = R_{ve} - r_{ve} = \left[\frac{3}{4\pi}\left(\frac{M_{BC}}{\rho_{BC}} + \frac{M_{org}}{\rho_{org}}\right)\right]^{1/3} - \left[\frac{3}{4\pi}\left(\frac{M_{BC}}{\rho_{BC}}\right)\right]^{1/3} \quad (1)$$

From calculation, for the change in mass by 29% after thermodenuding, we get the coating thickness of 8.4 nm for a nascent soot aggregate.

2. Fractal dimension plots of nascent and denuded soot pairs.

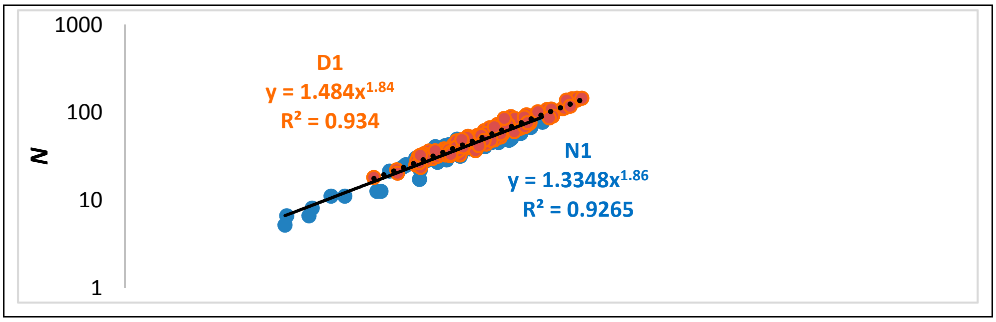
We calculated the fractal dimension from the log-log plot of N versus $\sqrt{LW}\,/d_p$ where the slope (power fit) gives D_f.

$$N = k_{LW}\left(\frac{\sqrt{LW}}{2R_p}\right)^{D_f} \quad (2)$$

Error in D_f values were calculated from regression statistics. As mentioned earlier in the paper, K_g values were estimated using the relation

$$K_g = K_{LW}\cdot(1.17)^{D_f} \quad (3)\ (3)$$

where $\sqrt{LW}\,/2R_g$=1.17 has been taken from Köylü et al. [2]. One can get the values of D_f and $K_{L\cdot W\cdot}$ from the log-log plot of N versus $\sqrt{LW}\,/d_p$ and these values when plugged in Eq. (I) gives the value of K_g.



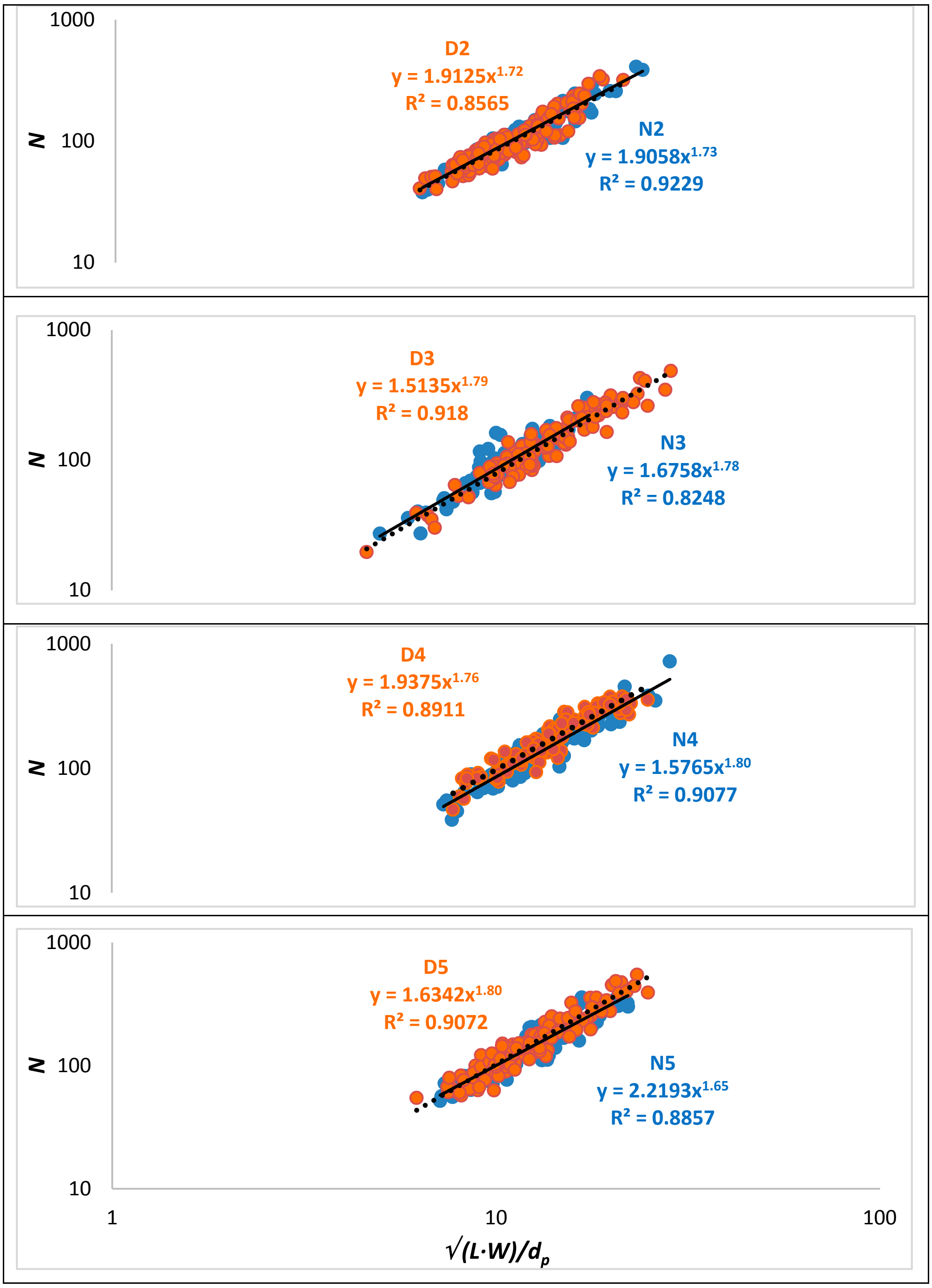


Figure S1. Plots of fractal dimension of nascent-denuded soot pairs. The solid line and dashed line in each plot represent the slope for nascent and denuded soot respectively.

References:

1. Slowik, J.G.; Cross, E.S.; Han, J.-H.; Davidovits, P.; Onasch, T.B.; Jayne, J.T.; Williams, L.R.; Canagaratna, M.R.; Worsnop, D.R.; Chakrabarty, R.K. An inter-comparison of instruments measuring black carbon content of soot particles. *Aerosol Science and Technology* **2007**, *41*, 295-314.
2. Köylü, Ü.Ö.; Faeth, G.; Farias, T.L.; Carvalho, M.d.G. Fractal and projected structure properties of soot aggregates. *Combustion and Flame* **1995**, *100*, 621-633.