

Supplementary Material for:

Implication of light absorption enhancement and mixing state of black carbon (BC) by coatings in Hong Kong

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Sampling site

As shown in Figure S1, the measurement was performed at Air Quality Management System (AQMS) site of Hong Kong Environmental Protection Department station, an urban site at rooftop of Yuen Long District Office Building, Yuen Long District, Hong Kong



Fig. S1 The location of sampling site in Hong Kong.

Temperature profile and loss test of Thermodenuder (TD)

Fig. S2 showed the comparison of temperature profile measured from the TD at a fixed temperature of 280 °C. Our TD is comparable to Wehner TD (Wehner et al. 2002), though the inlet temperature of our TD is a little lower. Both Wehner TD and our TD have high exit temperature, which would avoid recondensation before evaporated gases were adsorbed by activated charcoal, that may occur in Burtscher TD (Burtscher et al. 2001).

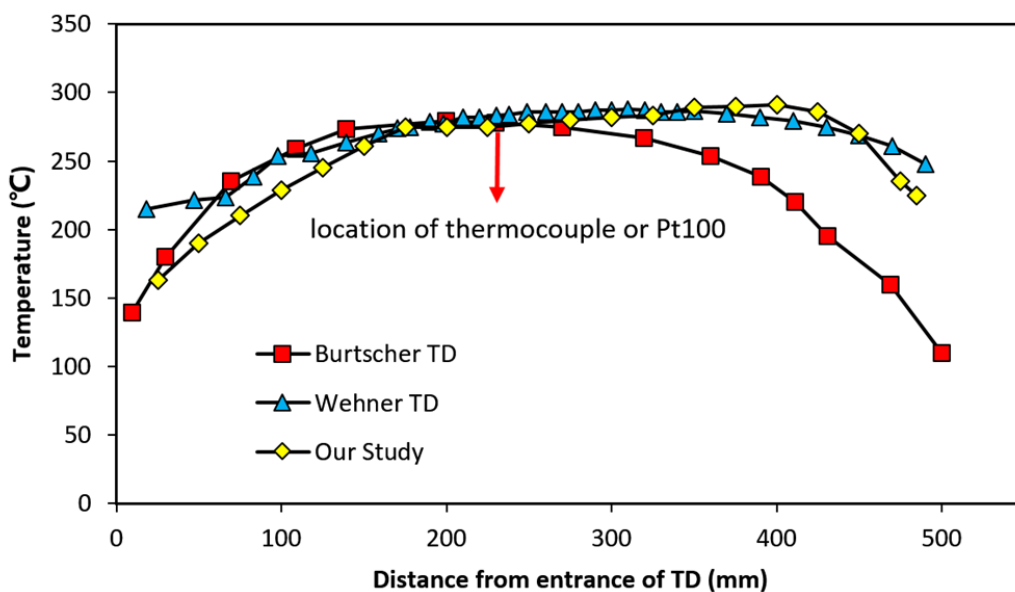


Fig. S2 Comparison of temperature profile inside the heating tube at a fixed temperature of 280°C

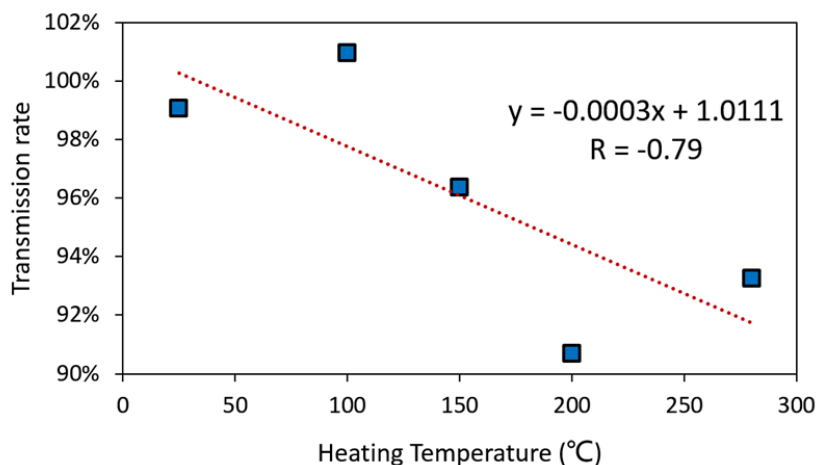


Fig. S3 TD loss test using elemental carbon (EC) as proxy. Transmission rate was calculated by dividing EC concentration though heated TD to ambient EC.

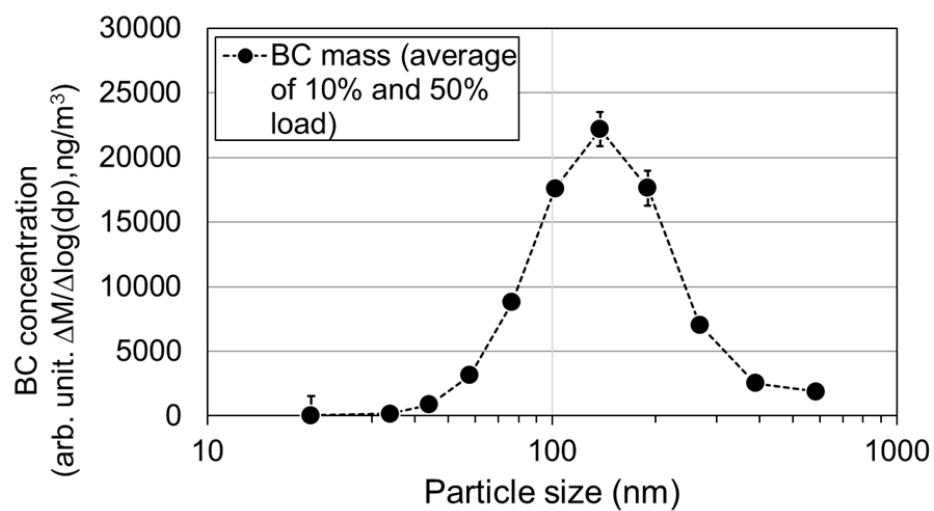


Fig. S4 BC mass size distribution from exhaust of direct diesel engine measured by DMA-Aeth-CPC tandem system. Note that there is slight difference on BC mass size distribution at 10% and 50% load of diesel engine, here we took the average.

PMF analysis on OA

We performed the PMF analysis on ACSM mass spectra to apportion the organic aerosol (OA) into distinct factors, with an Igor-Pro-based PMF Evaluation Tool (PET, v2.06)(Ulbrich et al. 2009). PMF analysis was limited to m/z 120 due to large interferences of internal standard of naphthalene at m/z 's 127–129. Mass spectra were shown as below. Two OA factors was resolved: a hydrocarbon-like OA (HOA) and an oxygenated OA (OOA), similar to study by Sun et al. (2012), that mass spectrum of HOA are characterized by the prominent hydrocarbon ion series of $C_nH_{2n-1}^+$ (e.g., m/z 27, 41, 55.) and $C_nH_{2n+1}^+$ (e.g., m/z 29, 43, 57.), and mass spectrum of OOA resembles to that of OOA-1 was characterized by a prominent peak at m/z 44 (mainly CO_2^+).

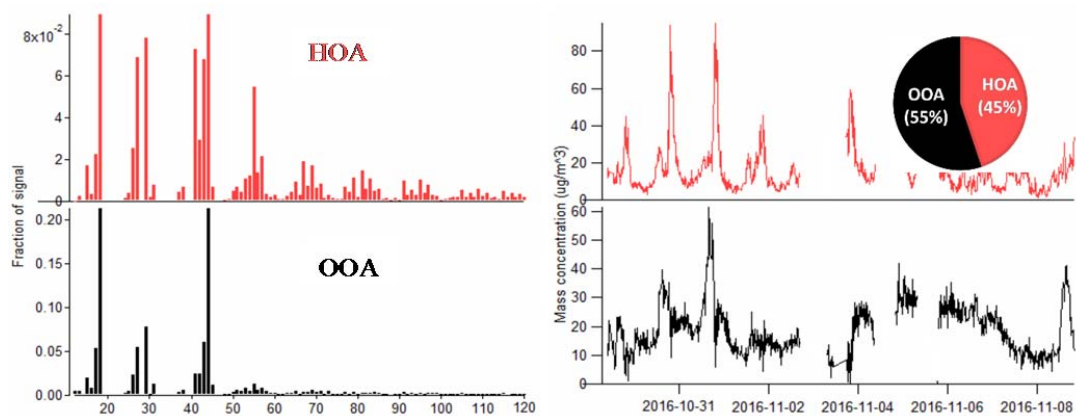


Fig. S5 Mass spectra and time series of mass concentrations of two OA components (HOA and OOA).

Reference

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