Supplement of

## Efficient droplet activation of ambient black carbon particles in sub-urban environment

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**Figure S1.** Time series of Benzene and Toluene mass concentrations, the ratio of Toluene and Benzene, and  $t_{age}$  (a). Frequency analysis of  $t_{age}$  at three different clusters (b).



**Figure S2.** Under SS=0.2%, a) and b) four clusters diurnal variations of activation diameter (D50), d), e) mass and number activation fraction ( $F_{act}$ ) for all particle and BCc, respectively. c) D50 and f)  $F_{act}$ , distributions of all-particles and BCc for four clusters, with solid circle indicating the average; in each box, the solid line and top and bottom boundaries represent the median, 75<sup>th</sup> and 25<sup>th</sup>, respectively.



Figure S3. Identical plots with Fig. S2 but for SS=0.3%.



Figure S4. The evolution of volume ratios of coating over rBC with photochemical age ( $t_{age}$ ) under SS at 0.1%, 0.2%, c) 0.3%.