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Supplement of

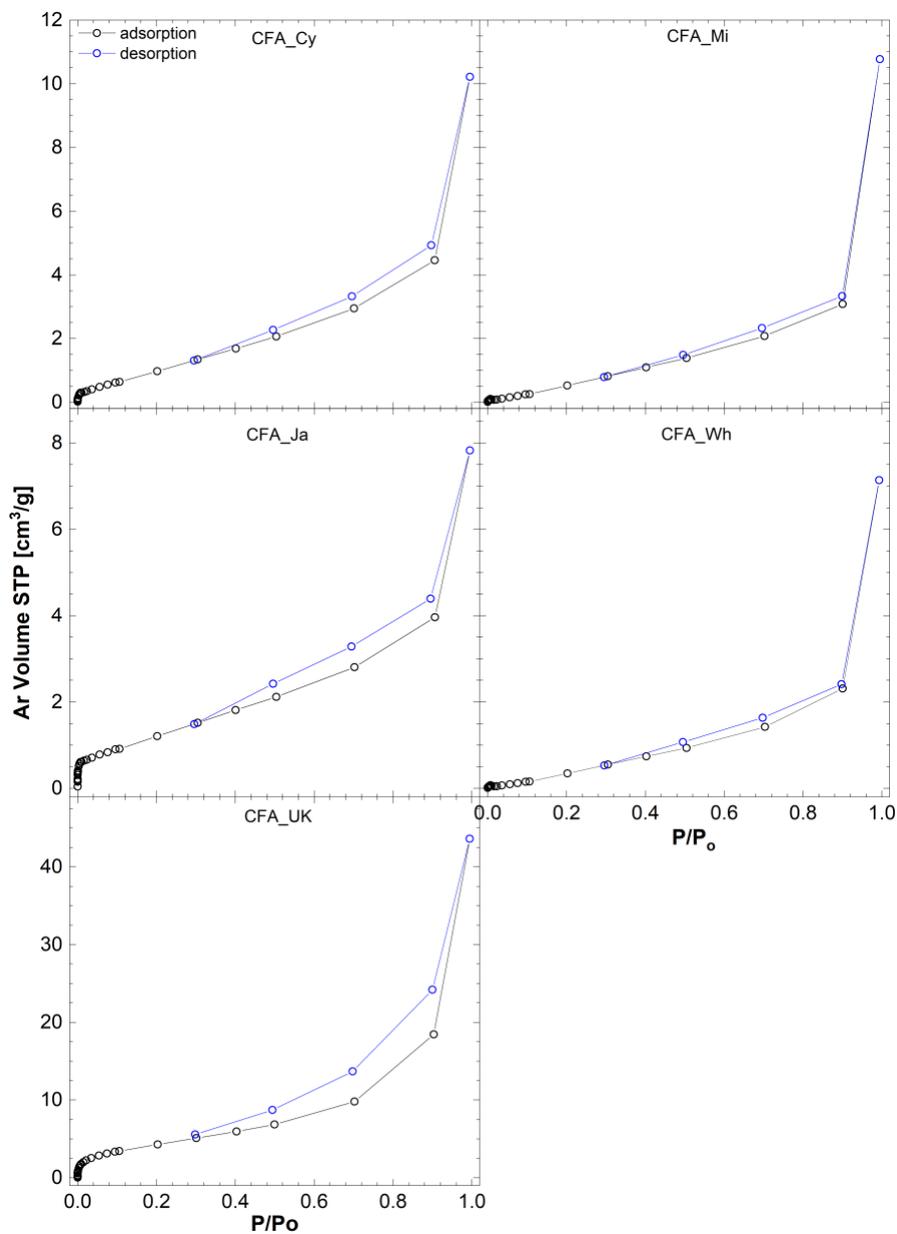
Enhanced ice nucleation activity of coal fly ash aerosol particles initiated by ice-filled pores

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1 The plots and information below support the discussions in the associated main article.



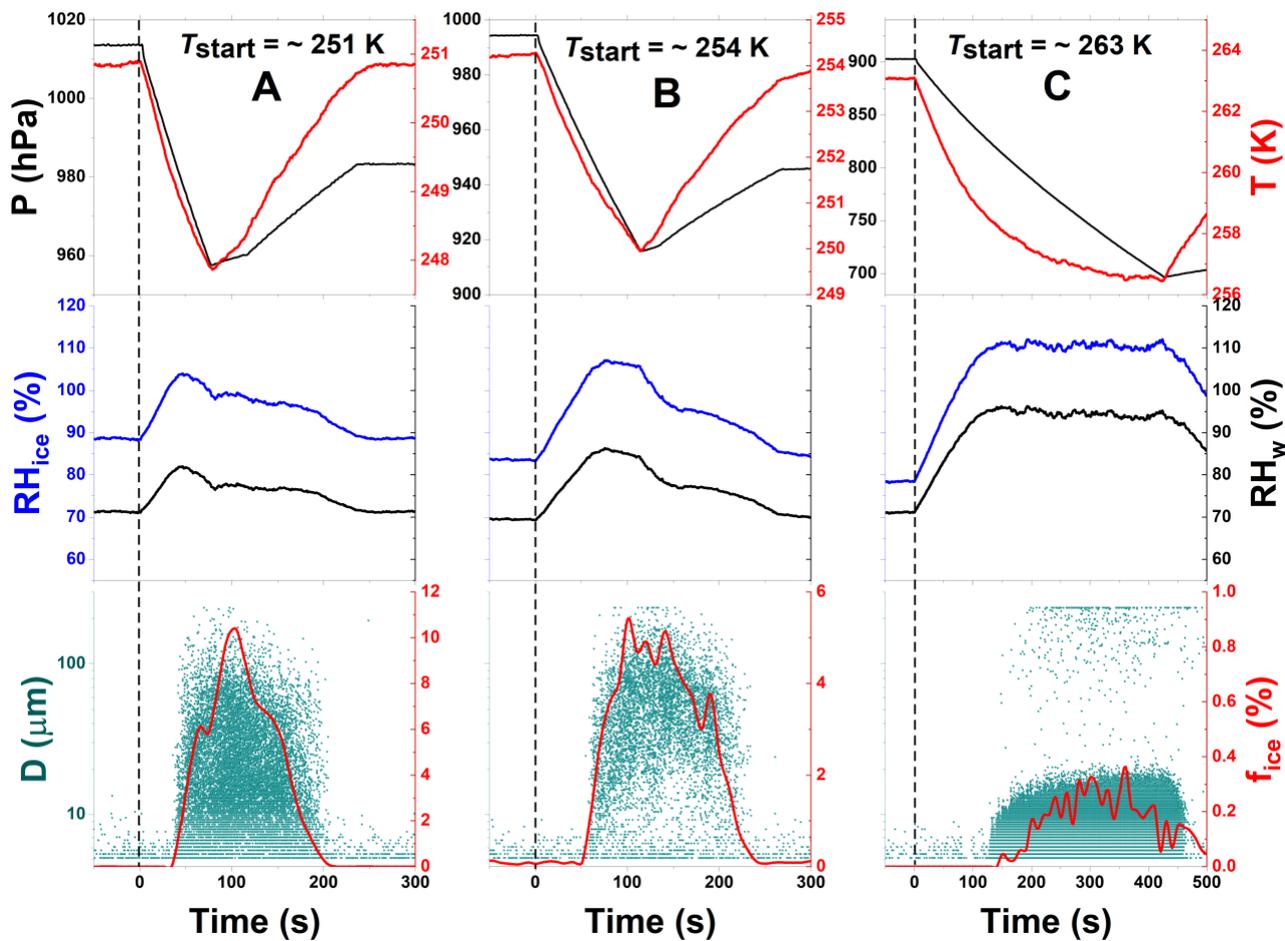
2

3 Figure S1: The adsorption and desorption isotherms of different CFA samples showing hysteresis.

4 This indicates that there are pores on the particles. The most significant hysteresis was observed in

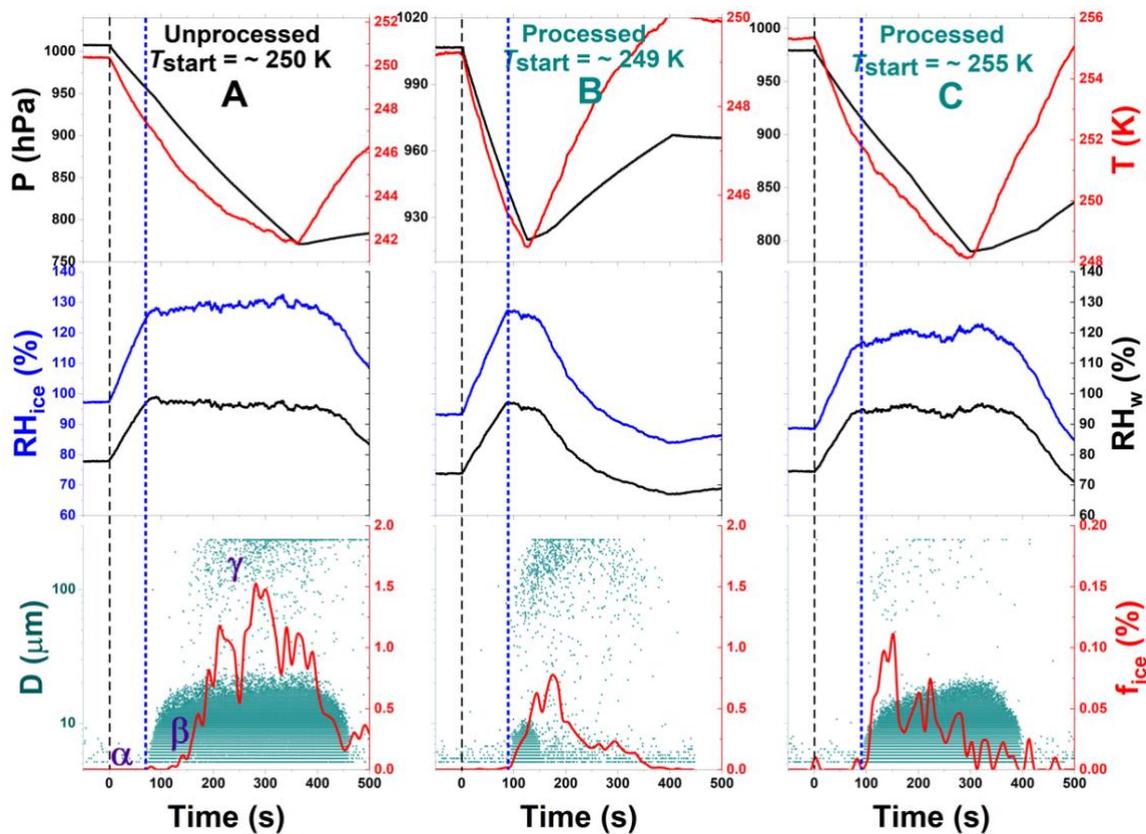
5 the CFA_UK sample.

6



7

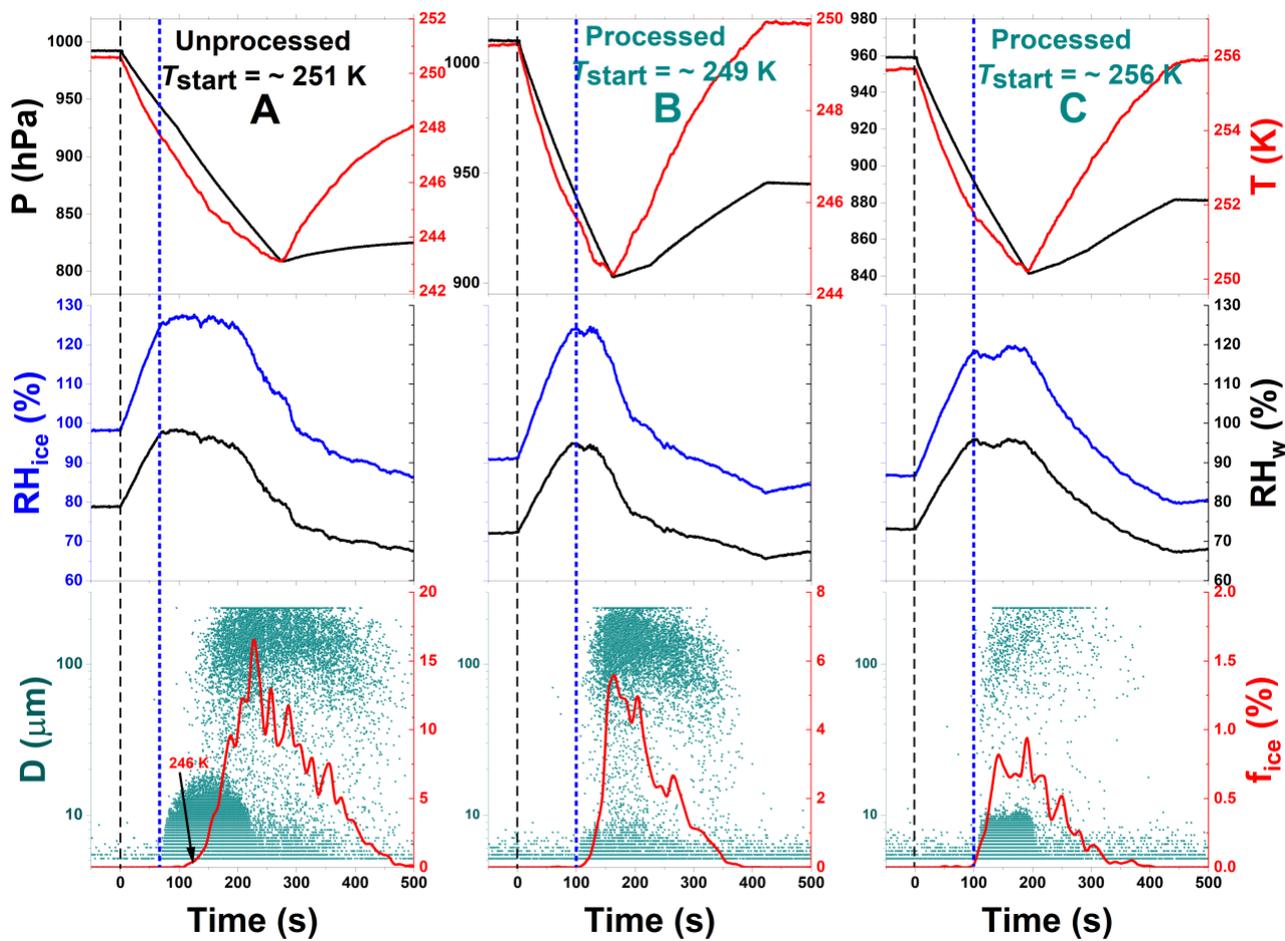
8 Figure S2: Freezing experiment data for processed CFA_UK particles at 251 K, 254 K, and 263 K
 9 start temperatures (T_{start}). These data correspond to experiments #12, #13, and #14 in Table 2,
 10 respectively. These are results from a repeat experiment for processed CFA_UK. The description of
 11 this plot is the same as given in Figure 3 of the main article.



12

13 Figure S3: Freezing experiment data for CFA_Mi at 250 K, 249 K, and 255 K start temperatures
 14 (T_{start}). These data correspond to experiments #8, #21, and #22 in Table 2, respectively. Column A
 15 shows ice nucleation data for the unprocessed CFA particles while columns B and C show data for
 16 the processed CFA particles. Each column A, B, and C has 3 plot panels – top, middle, and bottom.
 17 The top panels show the pressure (hPa) and the gas temperature (K) profiles of the AIDA
 18 cloud/aerosol simulation chamber throughout the duration of the experiment. The middle panels
 19 indicate the changes in the relative humidity with respect to ice (RH_{ice}) and water (RH_{w}), both in %.
 20 The bottom panels illustrate the data for the optical size measurements from the OPCs, showing the
 21 sizes of the CFA aerosol particles (α), particles activated into droplets (β), and ice particles (γ) like
 22 in Fig. 3. The bottom panels also present a plot of the ice-activated fraction (%) of the aerosol (thick
 23 red line). The dashed black lines indicate the beginning of the freezing experiment while the short-
 24 dashed blue lines show the beginning of cloud droplet formation.

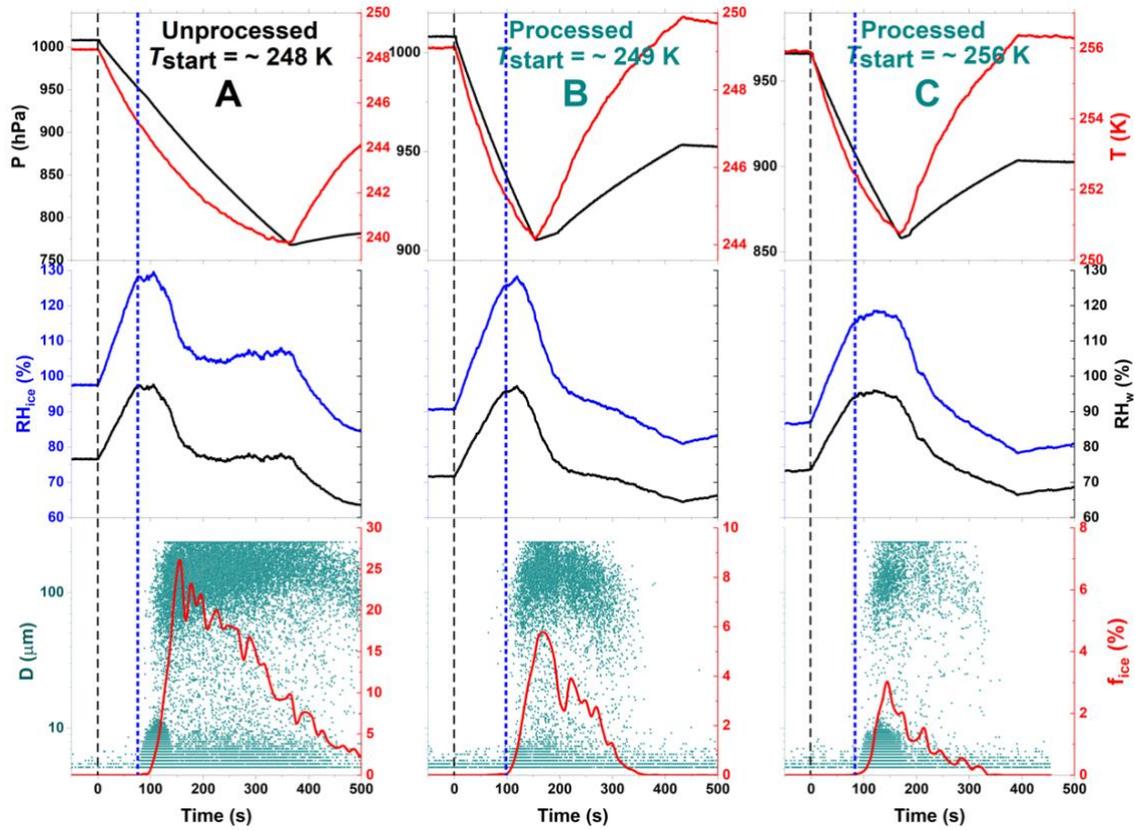
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26

27 Figure S4: Freezing experiment data for CFA_Ja at 251 K, 249 K, and 256 K start temperatures
 28 (T_{start}). These data correspond to experiments #6, #15, and #16 in Table 2, respectively. The
 29 individual panels contain the same measurement data as in Fig. S3.

30



31

32 Figure S5: Freezing experiment data for CFA_Wh at 248 K, 249 K, and 256 K start temperatures
 33 (T_{start}). These data correspond to experiments #7, #18, and #19 in Table 2, respectively. The
 34 individual panels contain the same measurement data as in Fig. S3.