

1 Large-Scale Bioaerosol Efficacy Evaluation  
2 of In-Duct Bipolar Ionization and  
3 Photocatalytic Devices

4 Supporting Information

5  
6 Supplementary Figures

7 **Figure S 1.** Photos from inside the test chamber. A) Facing towards the air return. B) Facing opposite  
8 direction of panel A (ZipWall not present). C) Technology installation section of HVAC system..... 2

9 **Figure S 2.** Representative ion concentration graphs from A) control test and B) bipolar ionization (BPI)  
10 device test. Yellow lines bound duration of test activity noted between the lines (sampling periods are  
11 all 10 minutes but appear shorter for the BPI device test vs. the control because the recording period of  
12 the ion data for the BPI test was longer in order to capture ion readings during the 90-minute device  
13 warm-up period). The peak in detected “ions” during nebulization is a result of charged particles being  
14 released in the process of MS2 aerosolization. .... 3

15 **Figure S 3.** Averaged results and first-order loss rate constant estimates for MS2 from control, A) bipolar  
16 ionization device experiments, and B) photocatalytic device experiments, calculated following Stephens  
17 et al. (2022) Interpreting Air Cleaner Performance Data in ASHRAE Journal 64(3):20-30. .... 4

18 **Figure S 4.** SMPS normalized particle concentration (where  $dN$  represents the number of particles in  
19 each SMPS size bin, and  $d\log D_p$  is the difference in the log of the channel width) at the beginning of the  
20 sampling periods noted in the legend for representative control and bipolar ionization (BPI) experiments  
21 for a representative (left) control test and (right) BPI test..... 5

22  
23 Supplementary Tables

24 **Table S 1.** Results from formal normality check on MS2 concentrations from bioaerosol samples using  
25 the Shapiro-Wilk test. .... 6

26 **Table S 2.** Ozone concentration measured during photocatalytic device experiments (reported in ppm). 6

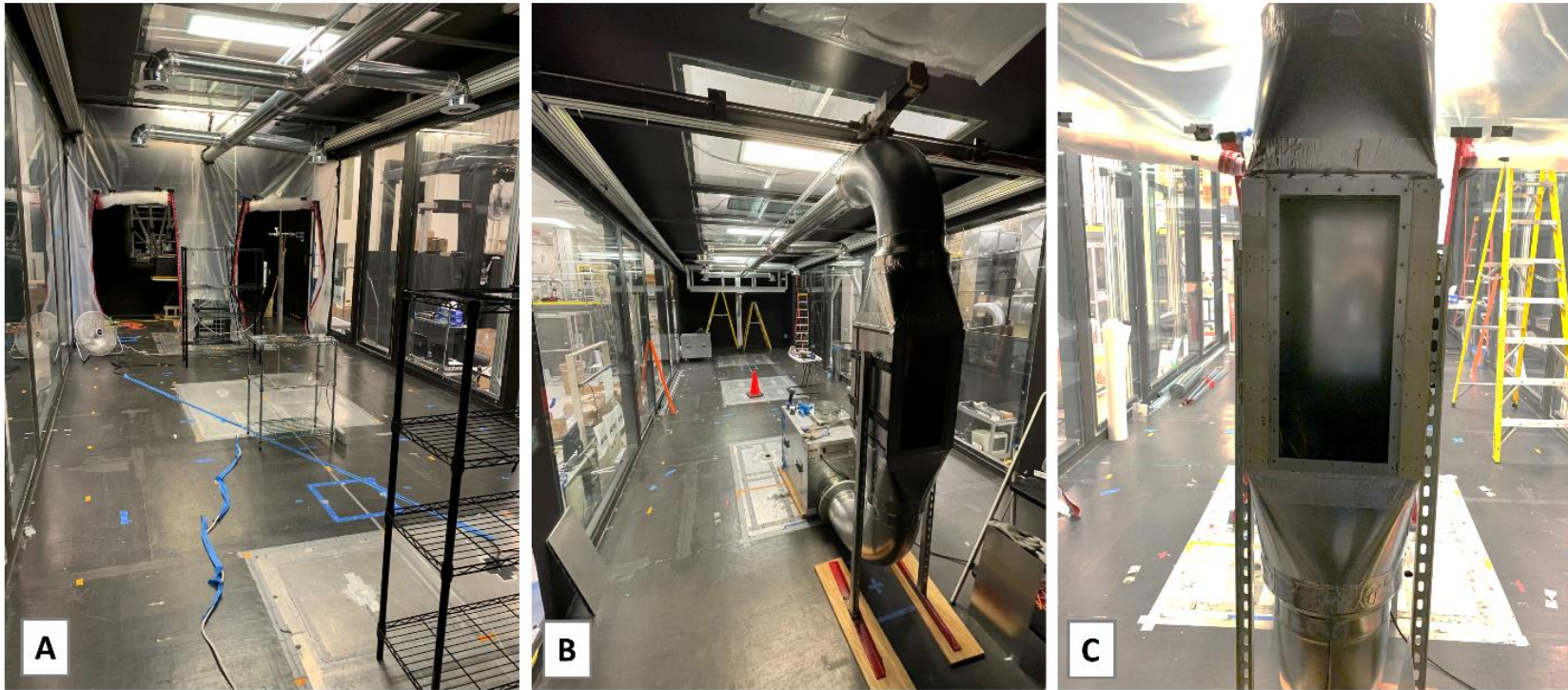
27 **Table S 3.** Results from formal normality check on MS2 deposition coupon data using the Shapiro-Wilk  
28 test. Results are reported for each coupon location or pooled over all locations (as noted). .... 7

29 **Table S 4.** Results from paired Welch’s t-test for the deposition coupons comparing the deposition  
30 coupons from each coupon location or pooled over all locations (as noted). .... 7

31

32 Supplementary Figures

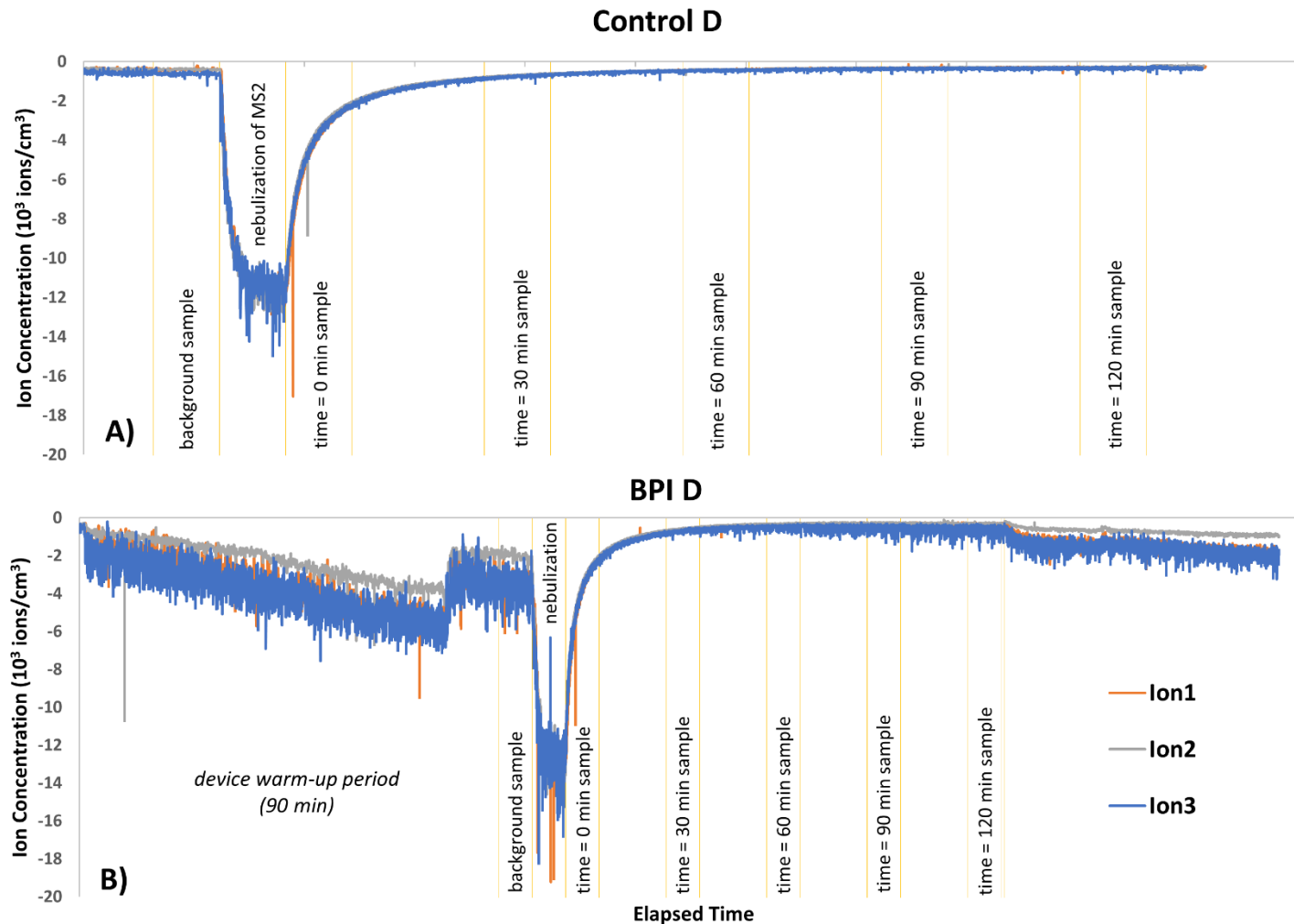
33



34

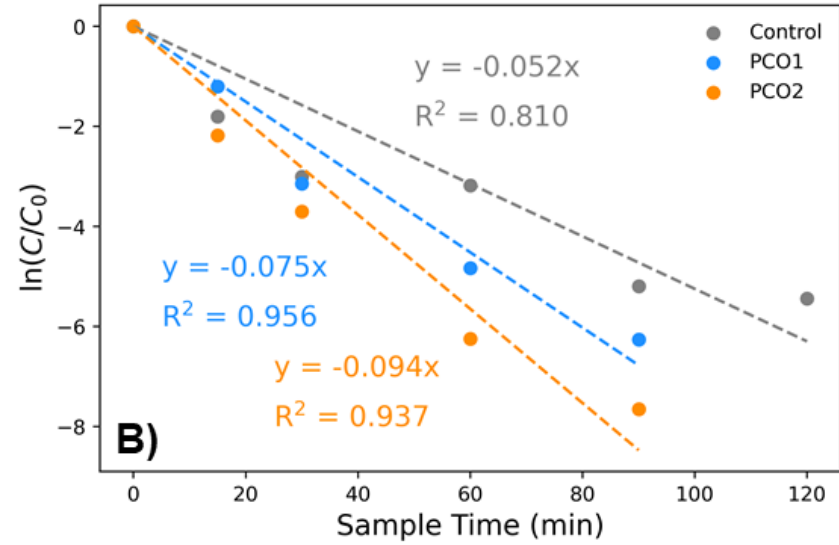
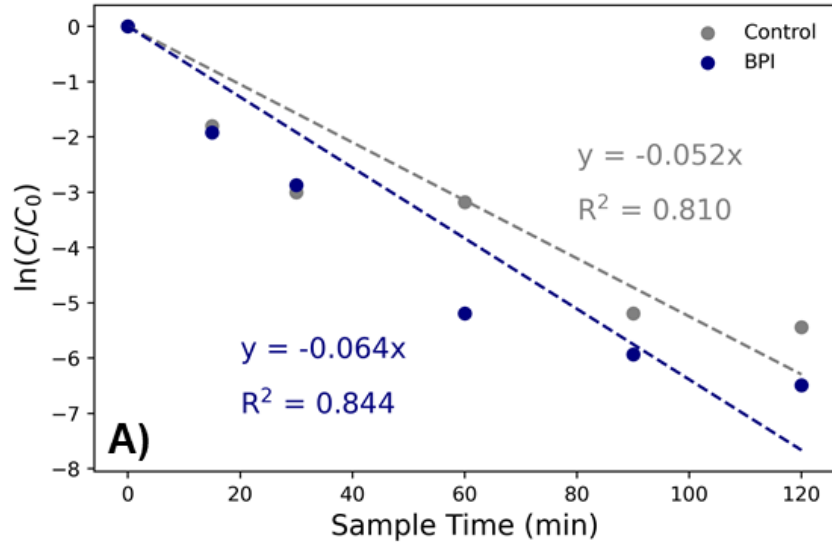
35 **Figure S 1.** Photos from inside the test chamber. A) Facing towards the air return. B) Facing opposite direction of panel A (ZipWall not present).  
36 C) Technology installation section of HVAC system.

37



38

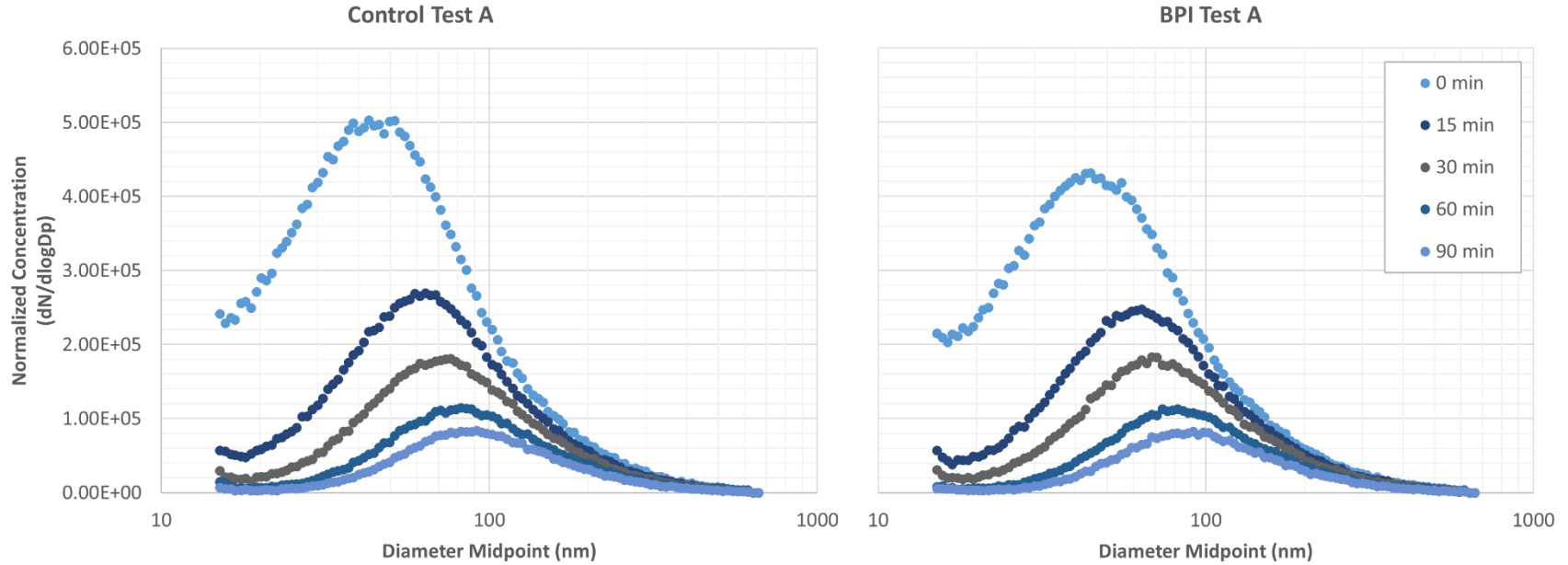
39 **Figure S 2.** Representative ion concentration graphs from A) control test and B) bipolar ionization (BPI) device test. Yellow lines bound duration  
 40 of test activity noted between the lines (sampling periods are all 10 minutes but appear shorter for the BPI device test vs. the control because  
 41 the recording period of the ion data for the BPI test was longer in order to capture ion readings during the 90-minute device warm-up period).  
 42 The peak in detected “ions” during nebulization is a result of charged particles being released in the process of MS2 aerosolization.



43

44 **Figure S 3.** Averaged results and first-order loss rate constant estimates for MS2 from control, A) bipolar ionization device experiments, and B)  
 45 photocatalytic device experiments, calculated following Stephens et al. (2022) *Interpreting Air Cleaner Performance Data* in ASHRAE Journal  
 46 64(3):20-30.

47



48

49 **Figure S 4.** SMPS normalized particle concentration (where dN represents the number of particles in each SMPS size bin, and dlogD<sub>p</sub> is the  
 50 difference in the log of the channel width) at the beginning of the sampling periods noted in the legend for representative control and bipolar  
 51 ionization (BPI) experiments for a representative (left) control test and (right) BPI test.

52 **Supplementary Tables**

53

54 **Table S 1.** Results from formal normality check on MS2 concentrations from bioaerosol samples using  
 55 the Shapiro-Wilk test.

Test Type	Sample Time (min)	Test Statistic	p-value
Control	15	0.838649	0.210546
	30	0.935701	0.635729
	60	0.98039	0.936693
	90	0.99078	0.982355
BPI	15	0.785645	0.08067
	30	0.930593	0.600417
	60	0.867873	0.257919
	90	0.971619	0.885541
PCO1	15	0.985533	0.769723
	30	0.976933	0.708805
	60	0.994124	0.85345
	90	0.894622	0.368581
PCO2	15	0.908785	0.414038
	30	0.995178	0.867273
	60	0.796954	0.107246
	90	0.807635	0.132858

56

57 **Table S 2.** Ozone concentration measured during photocatalytic device experiments (reported in ppm).

Test	Control E	PCO1 A	PCO1 B	PCO1 C	PCO2 A	PCO2 B	PCO2 C
Background	0.016	0.013	0.024	0.025	0.011	0.012	0.014
Nebulization	0.016	0.014	0.024	0.025	0.019	0.019	0.021
Time = 0 min	0.007	0.009	0.015	0.018	0.024	0.027	0.028
Time = 15 min	0.007	0.012	0.020	0.024	0.047	0.051	0.051
Time = 30 min	0.009	0.017	0.024	0.027	0.069	0.072	0.073
Time = 60 min	0.010	0.020	0.029	0.032	0.102	0.107	0.107
Time = 90 min	0.009	0.026	0.033	0.034	0.127	0.133	0.134

58

59 **Table S 3.** Results from formal normality check on MS2 deposition coupon data using the Shapiro-Wilk  
 60 test. Results are reported for each coupon location or pooled over all locations (as noted).

Test Type	Location	Test Statistic	p-value
Control	C1	0.852588	0.234651
	C2	0.849549	0.224704
	C3	0.9691	0.835905
	C4	0.945266	0.686678
	C5	0.948855	0.708974
BPI	C1	0.963933	0.635073
	C2	0.944803	0.547061
	C3	0.976692	0.707274
	C4	0.925802	0.47311
	C5	0.87333	0.305031
Control	all	0.963908	0.624506
BPI	all	0.955103	0.608041
PCO1	all	0.930213	0.597826

61

62 **Table S 4.** Results from paired Welch's t-test for the deposition coupons comparing the deposition  
 63 coupons from each coupon location or pooled over all locations (as noted).

Test Type	Location	Test statistic	p-value
BPI	C1	-1.41388	0.220767
	C2	0.832103	0.457438
	C3	-0.75138	0.486367
	C4	0.543033	0.625769
	C5	0.666959	0.548213
	all	0.267958	0.790715
PCO1	all	-0.61798	0.547535

64