

Supplementary Data for the manuscript: Distributed Compact Plasma Reactor Sterilization for Planetary Protection in Space Missions

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Supplementary Data:

This document contains supplementary data for the manuscript titled 'Distributed Compact Plasma Reactor Sterilization for Planetary Protection in Space Missions'.

Table S1: Summary of sterilization experiments with *E.coli*

Test Organism: <i>E. coli</i>						
Expt no.	Coupon Material	No. of CPPR	Exposure time (mins) [CPPR on and off alternately]	Control Log₁₀ (CFU/coupon)	Log reduction averaged over 11 points in the chamber Log₁₀ (CFU/coupon)	Complete killing
1	Aluminum	4	5 [5+ 0]	4.5	0.26±0.07	No
2	Aluminum	3	10 [10 + 0]	4.6	0.53±0.15	No
3	Aluminum	4	15 [10+5]	4.8	1.87±0.41	No
4	Aluminum	4	20 [15+5]	4.8	4.8±0.00	Yes
5	Aluminum	4	20 [15+5]	4.4	4.4±0.00	Yes
6	Aluminum	4	30 [15+5+5+5]	4.6	4.6±0.00	Yes
7	Orthofabric	4	15 [10+5]	4.1	4.1±0.00	Yes
8	Orthofabric	4	30 [25+5]	4.1	4.1±0.00	Yes
9	Aluminum	4	20 [15+5]	5.2	5.2±0.00	Yes
10	Aluminum	4	20 [15+5]	5.4	5.4±0.00	Yes
11	Polycarbonate	4	20 [15+5]	5.6	5.6±0.00	Yes
12	Polycarbonate	4	20 [15+5]	5.7	5.7±0.00	Yes
13	Orthofabric	4	20 [15+5]	4.9	4.9±0.00	Yes
14	Orthofabric	4	20 [15+5]	5.3	5.3±0.00	Yes
15	Kevlar	4	20 [15+5]	4.7	4.7±0.00	Yes
16	Kevlar	4	20 [15+5]	4	4±0.00	Yes
17	Orthofabric	4	20 [15+5]	3.6	3.6±0.00	Yes
18	Kevlar	4	20 [15+5]	4.9	4.9±0.00	Yes
19	Polycarbonate	4	20 [15+5]	5.3	5.3±0.00	Yes

Table S2: Summary of all experiments with *B. subtilis*

Test Organism: <i>B. subtilis</i>						
Expt no.	Coupon Material	No. of CPPR	Exposure time (mins) [CPPR on and off alternately]	Control Log₁₀ (CFU/coupon)	Log reduction averaged over 11 points in the chamber Log₁₀ (CFU/coupon)	Complete killing
20	Polycarbonate	3	10 [10+0]	5.1	0.76±0.15	No
21	Polycarbonate	4	20 [15+5]	5.2	1.31±0.09	No
22	Polycarbonate	4	30 [15+5+5+5]	5.6	1.40±0.29	No
23	Polycarbonate	4	30 [15+5+5+5]	5.1	1.38±0.20	No
24	Aluminum	4	25 [20+5]	4.6	1.6±0.14	No
25	Kevlar	6	30 [25+5]	4	3.5±0.8	No
26	Kevlar	6	30 [25+5]	3.6	3±0.8	No
27	Orthofabric	6	30 [25+5]	3.3	3.3±0	Yes
28	Aluminum	6	30 [25+5]	4.4	4.2±1	No
29	Polycarbonate	6	30 [25+5]	5	5	Yes
30	Aluminum	6	30 [25+5]	4.5	4.5	Yes
31	Orthofabric	6	30 [25+5]	3.6	3.6	Yes
32	Kevlar	6	30 [25+5]	4.3	4.3	Yes
33	Polycarbonate	6	30 [25+5]	4.4	4.4	Yes
34	Aluminum	6	30 [25+5]	5	5	Yes
35	Orthofabric	6	30 [25+5]	3.7	3.7	Yes
36	Orthofabric	6	30 [25+5]	4.4	4.4	Yes
37	Polycarbonate	6	30 [25+5]	5.2	5.2	Yes

Experiment 1:Test organism: *E. Coli*

Coupon material: Aluminum

No. of CPPRs used: 4

Exposure time: 5 minutes (CPPRs on throughout)

Table S3. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
3.05E+04	P1	Q3R3	1.61E+04	0.27
	P2	Q1R1	1.67E+04	0.26
		Q3R1	1.62E+04	0.27
		Q5R1	1.62E+04	0.27
		Q1R3	1.25E+04	0.38
		Q3R3	1.67E+04	0.26
		Q5R3	2.25E+04	0.13
		Q1R5	1.67E+04	0.26
		Q3R5	1.59E+04	0.28
		Q5R5	1.46E+04	0.32
	P3	Q3R3	2.21E+04	0.14
Average log reduction inside chamber				0.26±0.07

Experiment 2:Test organism: *E. Coli*

Coupon material: Aluminum

No. of CPPRs used: 3

Exposure time: 10 minutes (CPPRs on throughout)

Table S4. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
3.70E+04	P1	Q3R3	7.80E+03	0.67
	P2	Q1R1	6.30E+03	0.76
		Q3R1	2.03E+04	0.25
		Q5R1	8.55E+03	0.63
		Q1R3	1.32E+04	0.44
		Q3R3	1.25E+04	0.46
		Q5R3	9.15E+03	0.60
		Q1R5	1.31E+04	0.44
		Q3R5	7.65E+03	0.68
		Q5R5	1.41E+04	0.41
	P3	Q3R3	1.50E+03	1.38
Average log reduction inside chamber				0.53±0.15

Experiment 3:Test organism: *E. Coli*

Coupon material: Aluminum

No. of CPPRs used: 4

Exposure time: 15 minutes (10 minutes CPPR on + 5 minutes CPPR off)

Table S5. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
3.20E+04	P1	Q3R3	3.15E+02	2.00
	P2	Q1R1	5.85E+02	1.73
		Q3R1	5.70E+02	1.74
		Q5R1	2.55E+02	2.09
		Q1R3	6.75E+02	1.67
		Q3R3	2.40E+03	1.12
		Q5R3	6.00E+02	1.72
		Q1R5	4.50E+01	2.85
		Q3R5	3.15E+02	2.00
		Q5R5	5.55E+02	1.76
	P3	Q3R3	3.45E+02	1.96
Average log reduction inside chamber				1.87±0.41

Experiment 4:Test organism: *E. Coli*

Coupon material: Aluminum

No. of CPPRs used: 4

Exposure time: 20 minutes (15 minutes CPPR on + 5 minutes CPPR off)

Table S6. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
5.80E+04	P1	Q3R3	0	4.8
	P2	Q1R1	0	4.8
		Q3R1	0	4.8
		Q5R1	0	4.8
		Q1R3	0	4.8
		Q3R3	0	4.8
		Q5R3	0	4.8
		Q1R5	0	4.8
		Q3R5	0	4.8
		Q5R5	0	4.8
	P3	Q3R3	0	4.8
Average log reduction inside chamber				4.8±0.00

Experiment 5:Test organism: *E. Coli*

Coupon material: Aluminum

No. of CPPRs used: 4

Exposure time: 20 minutes (15 minutes CPPR on + 5 minutes CPPR off)

Table S7. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
2.35E+04	P1	Q3R3	0	4.4
	P2	Q1R1	0	4.4
		Q3R1	0	4.4
		Q5R1	0	4.4
		Q1R3	0	4.4
		Q3R3	0	4.4
		Q5R3	0	4.4
		Q1R5	0	4.4
		Q3R5	0	4.4
		Q5R5	0	4.4
	P3	Q3R3	0	4.4
Average log reduction inside chamber				4.4±0.00

Experiment 6:Test organism: *E. Coli*

Coupon material: Aluminum

No. of CPPRs used: 4

Exposure time: 30 minutes (15 minutes CPPR on + 5 minutes CPPR off +5 minutes CPPR on + 5 minutes CPPR off)

Table S8. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
3.85E+04	P1	Q3R3	0	4.6
	P2	Q1R1	0	4.6
		Q3R1	0	4.6
		Q5R1	0	4.6
		Q1R3	0	4.6
		Q3R3	0	4.6
		Q5R3	0	4.6
		Q1R5	0	4.6
		Q3R5	0	4.6
		Q5R5	0	4.6
	P3	Q3R3	0	4.6
Average log reduction inside chamber				4.6±0.00

Experiment 7:Test organism: *E. Coli*

Coupon material: Orthofabric

No. of CPPRs used: 4

Exposure time: 15 minutes (10 minutes CPPR on + 5 minutes CPPR off)

Table S9. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
1.00E+04	P1	Q3R3	0	4.1
	P2	Q1R1	0	4.1
		Q3R1	0	4.1
		Q5R1	0	4.1
		Q1R3	0	4.1
		Q3R3	0	4.1
		Q5R3	0	4.1
		Q1R5	0	4.1
		Q3R5	0	4.1
		Q5R5	0	4.1
	P3	Q3R3	0	4.1
Average log reduction inside chamber				4.1±0.00

Experiment 8:Test organism: *E. Coli*

Coupon material: Orthofabric

No. of CPPRs used: 4

Exposure time: 30 minutes (25 minutes CPPR on + 5 minutes CPPR off)

Table S10. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
1.00E+04	P1	Q3R3	0	4.1
	P2	Q1R1	0	4.1
		Q3R1	0	4.1
		Q5R1	0	4.1
		Q1R3	0	4.1
		Q3R3	0	4.1
		Q5R3	0	4.1
		Q1R5	0	4.1
		Q3R5	0	4.1
		Q5R5	0	4.1
	P3	Q3R3	0	4.1
Average log reduction inside chamber				4.1±0.00

Experiment 9:Test organism: *E. Coli*

Coupon material: Aluminum

No. of CPPRs used: 4

Exposure time: 20 minutes (15 minutes CPPR on + 5 minutes CPPR off)

Table S11. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
1.58E+05	P1	Q3R3	0	5.2
	P2	Q1R1	0	5.2
		Q3R1	0	5.2
		Q5R1	0	5.2
		Q1R3	0	5.2
		Q3R3	0	5.2
		Q5R3	0	5.2
		Q1R5	0	5.2
		Q3R5	0	5.2
		Q5R5	0	5.2
	P3	Q3R3	0	5.2
Average log reduction inside chamber				5.2+0.00

Experiment 10:Test organism: *E. Coli*

Coupon material: Aluminum

No. of CPPRs used: 4

Exposure time: 20 minutes (15 minutes CPPR on + 5 minutes CPPR off)

Table S12. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
2.51E+05	P1	Q3R3	0	5.4
	P2	Q1R1	0	5.4
		Q3R1	0	5.4
		Q5R1	0	5.4
		Q1R3	0	5.4
		Q3R3	0	5.4
		Q5R3	0	5.4
		Q1R5	0	5.4
		Q3R5	0	5.4
		Q5R5	0	5.4
	P3	Q3R3	0	5.4
Average log reduction inside chamber				5.4+0.00

Experiment 11:Test organism: *E. Coli*

Coupon material: Polycarbonate

No. of CPPRs used: 4

Exposure time: 20 minutes (15 minutes CPPR on + 5 minutes CPPR off)

Table S13. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
3.98E+05	P1	Q3R3	0	5.6
	P2	Q1R1	0	5.6
		Q3R1	0	5.6
		Q5R1	0	5.6
		Q1R3	0	5.6
		Q3R3	0	5.6
		Q5R3	0	5.6
		Q1R5	0	5.6
		Q3R5	0	5.6
		Q5R5	0	5.6
	P3	Q3R3	0	5.6
Average log reduction inside chamber				5.6+0.00

Experiment 12:Test organism: *E. Coli*

Coupon material: Polycarbonate

No. of CPPRs used: 4

Exposure time: 20 minutes (15 minutes CPPR on + 5 minutes CPPR off)

Table S14. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
5.01E+05	P1	Q3R3	0	5.7
	P2	Q1R1	0	5.7
		Q3R1	0	5.7
		Q5R1	0	5.7
		Q1R3	0	5.7
		Q3R3	0	5.7
		Q5R3	0	5.7
		Q1R5	0	5.7
		Q3R5	0	5.7
		Q5R5	0	5.7
	P3	Q3R3	0	5.7
Average log reduction inside chamber				5.7+0.00

Experiment 13:Test organism: *E. Coli*

Coupon material: Orthofabric

No. of CPPRs used: 4

Exposure time: 20 minutes (15 minutes CPPR on + 5 minutes CPPR off)

Table S15. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
7.94E+04	P1	Q3R3	0	4.9
	P2	Q1R1	0	4.9
		Q3R1	0	4.9
		Q5R1	0	4.9
		Q1R3	0	4.9
		Q3R3	0	4.9
		Q5R3	0	4.9
		Q1R5	0	4.9
		Q3R5	0	4.9
		Q5R5	0	4.9
	P3	Q3R3	0	4.9
Average log reduction inside chamber				4.9+0.00

Experiment 14:Test organism: *E. Coli*

Coupon material: Orthofabric

No. of CPPRs used: 4

Exposure time: 20 minutes (15 minutes CPPR on + 5 minutes CPPR off)

Table S16. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
2.00E+05	P1	Q3R3	0	5.3
	P2	Q1R1	0	5.3
		Q3R1	0	5.3
		Q5R1	0	5.3
		Q1R3	0	5.3
		Q3R3	0	5.3
		Q5R3	0	5.3
		Q1R5	0	5.3
		Q3R5	0	5.3
		Q5R5	0	5.3
	P3	Q3R3	0	5.3
Average log reduction inside chamber				5.3+0.00

Experiment 15:Test organism: *E. Coli*

Coupon material: Kevlar

No. of CPPRs used: 4

Exposure time: 20 minutes (15 minutes CPPR on + 5 minutes CPPR off)

Table S17. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
5.01E+04	P1	Q3R3	0	4.7
	P2	Q1R1	0	4.7
		Q3R1	0	4.7
		Q5R1	0	4.7
		Q1R3	0	4.7
		Q3R3	0	4.7
		Q5R3	0	4.7
		Q1R5	0	4.7
		Q3R5	0	4.7
		Q5R5	0	4.7
	P3	Q3R3	0	4.7
Average log reduction inside chamber				4.7+0.00

Experiment 16:Test organism: *E. Coli*

Coupon material: Kevlar

No. of CPPRs used: 4

Exposure time: 20 minutes (15 minutes CPPR on + 5 minutes CPPR off)

Table S18. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
1.00E+04	P1	Q3R3	0	4
	P2	Q1R1	0	4
		Q3R1	0	4
		Q5R1	0	4
		Q1R3	0	4
		Q3R3	0	4
		Q5R3	0	4
		Q1R5	0	4
		Q3R5	0	4
		Q5R5	0	4
	P3	Q3R3	0	4
Average log reduction inside chamber				4.0+0.00

Experiment 17:Test organism: *E. Coli*

Coupon material: Orthofabric

No. of CPPRs used: 4

Exposure time: 20 minutes (15 minutes CPPR on + 5 minutes CPPR off)

Table S19. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
3.98E+03	P1	Q3R3	0	3.6
	P2	Q1R1	0	3.6
		Q3R1	0	3.6
		Q5R1	0	3.6
		Q1R3	0	3.6
		Q3R3	0	3.6
		Q5R3	0	3.6
		Q1R5	0	3.6
		Q3R5	0	3.6
		Q5R5	0	3.6
	P3	Q3R3	0	3.6
Average log reduction inside chamber				3.6+0.00

Experiment 18:Test organism: *E. Coli*

Coupon material: Kevlar

No. of CPPRs used: 4

Exposure time: 20 minutes (15 minutes CPPR on + 5 minutes CPPR off)

Table S20. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
7.94E+04	P1	Q3R3	0	4.9
	P2	Q1R1	0	4.9
		Q3R1	0	4.9
		Q5R1	0	4.9
		Q1R3	0	4.9
		Q3R3	0	4.9
		Q5R3	0	4.9
		Q1R5	0	4.9
		Q3R5	0	4.9
		Q5R5	0	4.9
	P3	Q3R3	0	4.9
Average log reduction inside chamber				4.9+0.00

Experiment 19:Test organism: *E. Coli*

Coupon material: Polycarbonate

No. of CPPRs used: 4

Exposure time: 20 minutes (15 minutes CPPR on + 5 minutes CPPR off)

Table S21. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
2.00E+05	P1	Q3R3	0	5.3
	P2	Q1R1	0	5.3
		Q3R1	0	5.3
		Q5R1	0	5.3
		Q1R3	0	5.3
		Q3R3	0	5.3
		Q5R3	0	5.3
		Q1R5	0	5.3
		Q3R5	0	5.3
		Q5R5	0	5.3
	P3	Q3R3	0	5.3
Average log reduction inside chamber				5.3±0.00

Experiment 20:Test organism: *B.Subtilis*

Coupon material: Polycarbonate

No. of CPPRs used: 3

Exposure time: 10 minutes (CPPRs on throughout)

Table S22. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
1.23E+05	P1	Q3R3	2.63E+04	0.68
	P2	Q1R1	1.71E+04	0.87
		Q3R1	2.31E+04	0.74
		Q5R1	2.46E+04	0.71
		Q1R3	2.78E+04	0.66
		Q3R3	2.70E+04	0.67
		Q5R3	2.09E+04	0.78
		Q1R5	2.24E+04	0.75
		Q3R5	2.72E+04	0.67
		Q5R5	2.79E+04	0.65
	P3	Q3R3	7.95E+03	1.20
Average log reduction inside chamber				0.76±0.15

Experiment 21:Test organism: *B.Subtilis*

Coupon material: Polycarbonate

No. of CPPRs used: 4

Exposure time: 20 minutes (15 minutes CPPR on + 5 minutes CPPR off)

Table S23. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
1.61E+05	P1	Q3R3	9.00E+03	1.25
	P2	Q1R1	6.75E+03	1.37
		Q3R1	7.20E+03	1.34
		Q5R1	5.70E+03	1.44
		Q1R3	1.23E+04	1.11
		Q3R3	6.15E+03	1.41
		Q5R3	7.95E+03	1.30
		Q1R5	**	**
		Q3R5	9.30E+03	1.23
		Q5R5	7.20E+03	1.34
	P3	Q3R3	8.10E+03	1.29
Average log reduction inside chamber				1.31±0.09

Experiment 22:Test organism: *B.Subtilis*

Coupon material: Polycarbonate

No. of CPPRs used: 4

Exposure time: 30 minutes (15 minutes CPPR on + 5 minutes CPPR off +5 minutes CPPR on + 5 minutes CPPR off)

Table S24. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
4.75E+05	P1	Q3R3	3.00E+04	1.22
	P2	Q1R1	2.30E+04	1.34
		Q3R1	2.12E+04	1.37
		Q5R1	3.90E+03	2.11
		Q1R3	2.76E+04	1.26
		Q3R3	4.50E+03	2.05
		Q5R3	3.75E+04	1.13
		Q1R5	3.00E+04	1.22
		Q3R5	3.00E+04	1.22
		Q5R5	2.25E+04	1.35
	P3	Q3R3	1.23E+04	1.61
Average log reduction inside chamber				1.40±0.29

Experiment 23:Test organism: *B.Subtilis*

Coupon material: Polycarbonate

No. of CPPRs used: 4

Exposure time: 30 minutes (15 minutes CPPR on + 5 minutes CPPR off +5 minutes CPPR on + 5 minutes CPPR off)

Table S25. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
1.24E+05	P1	Q3R3	3.45E+03	1.56
	P2	Q1R1	3.60E+03	1.54
		Q3R1	6.30E+03	1.30
		Q5R1	1.05E+04	1.08
		Q1R3	4.65E+03	1.43
		Q3R3	6.00E+02	2.32
		Q5R3	2.25E+03	1.75
		Q1R5	6.60E+03	1.28
		Q3R5	4.50E+03	1.45
		Q5R5	6.30E+03	1.30
	P3	Q3R3	9.00E+03	1.15
Average log reduction inside chamber				1.38±0.20

Experiment 24:Test organism: *B.Subtilis*

Coupon material: Aluminum

No. of CPPRs used: 4

Exposure time: 25 minutes (20 minutes CPPR on + 5 minutes CPPR off)

Table S26. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
1.23E+05	P1	Q3R3	2.70E+03	1.67
	P2	Q1R1	2.10E+03	1.78
		Q3R1	2.70E+03	1.67
		Q5R1	4.80E+03	1.42
		Q1R3	4.35E+03	1.46
		Q3R3	4.35E+03	1.46
		Q5R3	2.40E+03	1.72
		Q1R5	**	**
		Q3R5	2.10E+03	1.78
		Q5R5	4.65E+03	1.43
	P3	Q3R3	3.30E+03	1.58
Average log reduction inside chamber				1.6±0.14

Experiment 25:Test organism: *B.Subtilis*

Coupon material: Kevlar

No. of CPPRs used: 6

Exposure time: 30 minutes (25 minutes CPPR on + 5 minutes CPPR off)

Table S27. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
1.26E+04	P1	Q3R3	0.00E+00	4.1
	P2	Q1R1	0.00E+00	4.1
		Q3R1	0.00E+00	4.1
		Q5R1	0.00E+00	4.1
		Q1R3	0.00E+00	4.1
		Q3R3	6.00E+01	2.32
		Q5R3	1.95E+02	1.80
		Q1R5	0.00E+00	4.1
		Q3R5	3.00E+01	2.62
		Q5R5	0.00E+00	4.1
	P3	Q3R3	0.00E+00	4.1
Average log reduction inside chamber				3.5±0.8

Experiment 26:Test organism: *B.Subtilis*

Coupon material: Kevlar

No. of CPPRs used: 6

Exposure time: 30 minutes (25 minutes CPPR on + 5 minutes CPPR off)

Table S28. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
4.07E+03	P1	Q3R3	0.00E+00	3.6
	P2	Q1R1	0.00E+00	3.6
		Q3R1	0.00E+00	3.6
		Q5R1	0.00E+00	3.6
		Q1R3	3.00E+01	2.12
		Q3R3	6.00E+01	1.82
		Q5R3	7.50E+01	1.72
		Q1R5	0.00E+00	3.6
		Q3R5	4.50E+01	1.94
		Q5R5	0.00E+00	3.6
	P3	Q3R3	0.00E+00	3.6
Average log reduction inside chamber				3.0±0.8

Experiment 27:Test organism: *B.Subtilis*

Coupon material: Orthofabric

No. of CPPRs used: 6

Exposure time: 30 minutes (25 minutes CPPR on + 5 minutes CPPR off)

Table S29. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
2.00E+03	P1	Q3R3	0	3.3
	P2	Q1R1	0	3.3
		Q3R1	0	3.3
		Q5R1	0	3.3
		Q1R3	0	3.3
		Q3R3	0	3.3
		Q5R3	0	3.3
		Q1R5	0	3.3
		Q3R5	0	3.3
		Q5R5	0	3.3
	P3	Q3R3	0	3.3
Average log reduction inside chamber				3.3_{±0}

Experiment 28:Test organism: *B.Subtilis*

Coupon material: Aluminum

No. of CPPRs used: 6

Exposure time: 30 minutes (25 minutes CPPR on + 5 minutes CPPR off)

Table S30. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
2.51E+04	P1	Q3R3	0.00E+00	4.4
	P2	Q1R1	1.50E+01	3.22
		Q3R1	0.00E+00	4.4
		Q5R1	0.00E+00	4.4
		Q1R3	0.00E+00	4.4
		Q3R3	0.00E+00	4.4
		Q5R3	0.00E+00	4.4
		Q1R5	0.00E+00	4.4
		Q3R5	1.50E+01	3.22
		Q5R5	0.00E+00	4.4
	P3	Q3R3	0.00E+00	4.4
Average log reduction inside chamber				4.2_{±1}

Experiment 29:Test organism: *B.Subtilis*

Coupon material: Polycarbonate

No. of CPPRs used: 6

Exposure time: 30 minutes (25 minutes CPPR on + 5 minutes CPPR off)

Table S31. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
1.00E+05	P1	Q3R3	0	5
	P2	Q1R1	0	5
		Q3R1	0	5
		Q5R1	0	5
		Q1R3	0	5
		Q3R3	0	5
		Q5R3	0	5
		Q1R5	0	5
		Q3R5	0	5
		Q5R5	0	5
	P3	Q3R3	0	5
Average log reduction inside chamber				5_{±0}

Experiment 30:Test organism: *B.Subtilis*

Coupon material: Polycarbonate

No. of CPPRs used: 6

Exposure time: 30 minutes (25 minutes CPPR on + 5 minutes CPPR off)

Table S32. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
3.16E+04	P1	Q3R3	0	4.5
	P2	Q1R1	0	4.5
		Q3R1	0	4.5
		Q5R1	0	4.5
		Q1R3	0	4.5
		Q3R3	0	4.5
		Q5R3	0	4.5
		Q1R5	0	4.5
		Q3R5	0	4.5
		Q5R5	0	4.5
	P3	Q3R3	0	4.5
Average log reduction inside chamber				4.5_{±0}

Experiment 31:Test organism: *B.Subtilis*

Coupon material: Orthofabric

No. of CPPRs used: 6

Exposure time: 30 minutes (25 minutes CPPR on + 5 minutes CPPR off)

Table S33. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
3.98E+03	P1	Q3R3	0	3.6
	P2	Q1R1	0	3.6
		Q3R1	0	3.6
		Q5R1	0	3.6
		Q1R3	0	3.6
		Q3R3	0	3.6
		Q5R3	0	3.6
		Q1R5	0	3.6
		Q3R5	0	3.6
		Q5R5	0	3.6
	P3	Q3R3	0	3.6
Average log reduction inside chamber				3.6_{±0}

Experiment 32:Test organism: *B.Subtilis*

Coupon material: Kevlar

No. of CPPRs used: 6

Exposure time: 30 minutes (25 minutes CPPR on + 5 minutes CPPR off)

Table S34. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
2.00E+04	P1	Q3R3	0	4.3
	P2	Q1R1	0	4.3
		Q3R1	0	4.3
		Q5R1	0	4.3
		Q1R3	0	4.3
		Q3R3	0	4.3
		Q5R3	0	4.3
		Q1R5	0	4.3
		Q3R5	0	4.3
		Q5R5	0	4.3
	P3	Q3R3	0	4.3
Average log reduction inside chamber				4.3_{±0}

Experiment 33:Test organism: *B.Subtilis*

Coupon material: Polycarbonate

No. of CPPRs used: 6

Exposure time: 30 minutes (25 minutes CPPR on + 5 minutes CPPR off)

Table S35. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
2.51E+04	P1	Q3R3	0	4.4
	P2	Q1R1	0	4.4
		Q3R1	0	4.4
		Q5R1	0	4.4
		Q1R3	0	4.4
		Q3R3	0	4.4
		Q5R3	0	4.4
		Q1R5	0	4.4
		Q3R5	0	4.4
		Q5R5	0	4.4
	P3	Q3R3	0	4.4
Average log reduction inside chamber				4.4₀

Experiment 34:Test organism: *B.Subtilis*

Coupon material: Aluminum

No. of CPPRs used: 6

Exposure time: 30 minutes (25 minutes CPPR on + 5 minutes CPPR off)

Table S36. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
1.00E+05	P1	Q3R3	0	5
	P2	Q1R1	0	5
		Q3R1	0	5
		Q5R1	0	5
		Q1R3	0	5
		Q3R3	0	5
		Q5R3	0	5
		Q1R5	0	5
		Q3R5	0	5
		Q5R5	0	5
	P3	Q3R3	0	5
Average log reduction inside chamber				5₀

Experiment 35:Test organism: *B.Subtilis*

Coupon material: Orthofabric

No. of CPPRs used: 6

Exposure time: 30 minutes (25 minutes CPPR on + 5 minutes CPPR off)

Table S37. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
5.01E+03	P1	Q3R3	0	3.7
	P2	Q1R1	0	3.7
		Q3R1	0	3.7
		Q5R1	0	3.7
		Q1R3	0	3.7
		Q3R3	0	3.7
		Q5R3	0	3.7
		Q1R5	0	3.7
		Q3R5	0	3.7
		Q5R5	0	3.7
	P3	Q3R3	0	3.7
Average log reduction inside chamber				3.7_{±0}

Experiment 36:Test organism: *B.Subtilis*

Coupon material: Orthofabric

No. of CPPRs used: 6

Exposure time: 30 minutes (25 minutes CPPR on + 5 minutes CPPR off)

Table S38. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
2.51E+04	P1	Q3R3	0	4.4
	P2	Q1R1	0	4.4
		Q3R1	0	4.4
		Q5R1	0	4.4
		Q1R3	0	4.4
		Q3R3	0	4.4
		Q5R3	0	4.4
		Q1R5	0	4.4
		Q3R5	0	4.4
		Q5R5	0	4.4
	P3	Q3R3	0	4.4
Average log reduction inside chamber				4.4_{±0}

Experiment 37:Test organism: *B.Subtilis*

Coupon material: Polycarbonate

No. of CPPRs used: 6

Exposure time: 30 minutes (25 minutes CPPR on + 5 minutes CPPR off)

Table S39. Distribution in disinfection in the internal volume of the APS prototype

Control	Exposed			Log reduction
CFU/coupon	Plane	Position	CFU/coupon	Log₁₀ (CFU/coupon)
1.58E+05	P1	Q3R3	0	5.2
	P2	Q1R1	0	5.2
		Q3R1	0	5.2
		Q5R1	0	5.2
		Q1R3	0	5.2
		Q3R3	0	5.2
		Q5R3	0	5.2
		Q1R5	0	5.2
		Q3R5	0	5.2
		Q5R5	0	5.2
	P3	Q3R3	0	5.2
Average log reduction inside chamber				5.2₀