Supplementary Information: The effect of plasma pre-treatment on the electrical resistance of MXene ($Ti_3C_2T_x$) coated fabrics

Ashleigh Naysmith,*[a] Timothy Smith [a], Andrew Hewitt [a], Naeem Mian [b]

The data supporting this article have been included as part of the Supplementary Information.

Supplementary information 1 MXene synthesis

Titanium aluminium carbide (MAX phase) (Purity: 99+%, CAS number 196506-01-1) was purchased from Nanografi Nanotechnology. Hydrochloric acid (37%, CAS number 7647-01-0) and lithium fluoride (powder, -300 mesh, CAS number 7789-24-4) were purchased from Sigma Aldrich. Deionised water (DI) was used from laboratory stock. All chemicals were received as purchased and used without further purification.

Hydrochloric acid (9 M) was added to a HDPE screw cap bottle and added to a water bath set to 35°C. Upon addition of the MAX phase, the temperature rose to 44°C. The stirring was set to 220 – 250 RPM. Over 30 minutes, 24 ±0.05 g lithium fluoride was slowly added to the 300.0 ±1.0 ml HCl separated into three HDPE bottles, each with 100 ±1.0 ml HCl and 8 ±0.05 g LiF. Subsequently, 5 ±0.05 g of MAX phase titanium aluminium carbide was added to each solution over 15 minutes, totalling 15.0 ±0.05 g of MAX phase. The reaction was left to proceed for 24 hours. MXene was washed with DI water and centrifuged for 7 minutes at 3500 rpm. Separating the MXene and acidic supernatant proved difficult, so the centrifugation was increased to 15 minutes at 6000 rpm. This was reduced to 5 minutes at 6000 rpm once the separation occurred more cleanly.

The acidic supernatant was poured or pipetted out from the centrifuge tube, further DI water was added, and the process was repeated until the supernatant reached a pH =>6. Following this, the MXene sediment was sonicated for 35 minutes. The freshly made MXene was analysed under the UV-vis spectrophotometer (Figure 124) The solution was then immersed in liquid nitrogen and freeze-dried for 120 hours. The synthesised MXene powder was then added to DI water to create the MXene ink.

MXenes were prepared following a Minimally Intensive Layer Delamination (MILD) method (Ghidiu et al., 2014). Minor variations to the standard technique are detailed in the individual studies. Safety procedures were prioritised. Experiments were conducted in a fume hood until the MXene product reached pH 5 following wash cycles. Personal protective equipment (PPE) was donned as follows:

- Lab coat
- Butyl rubber apron
- Nitrile gloves
- Chemical resistance gloves and gauntlets
- Second pair of nitrile gloves
- Safety glasses
- Full face shield
- PPE for the second person is prepared in case of an emergency
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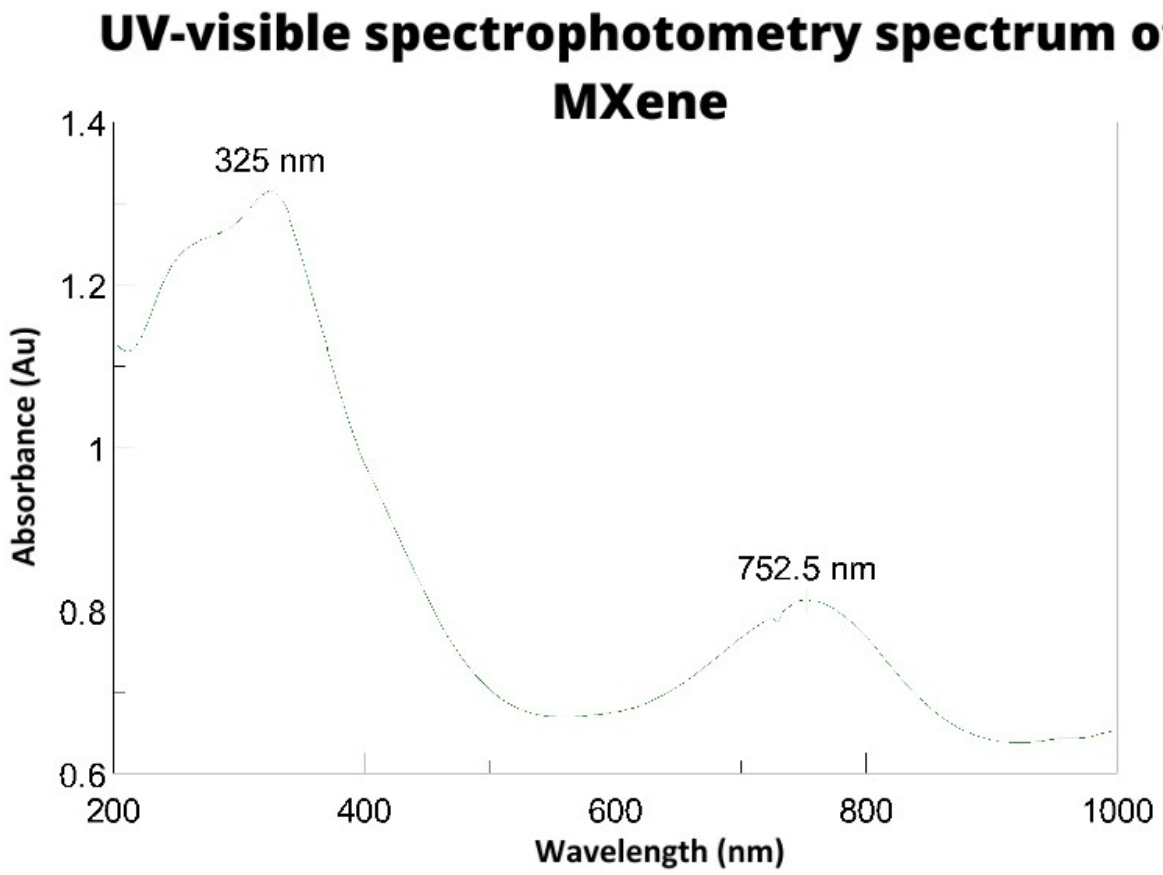
PTFE and HPDE equipment were used. Glassware and many plastics labware could not be used due to the hydrofluoric acid produced in situ, which risks degradation and destruction of these materials. Polypropylene centrifuge tubes were used post-MXene etching. Chemical absorbent matting was placed on the bench. Silver foil was used to protect the hot plate in case of spillage.

The MXene synthesis process is illustrated in Figure 102.
1. A volume of 20.0 ±0.1 ml HCl was used per 1.0 ±0.05 g of MAX phase. The ratio of MAX phase to LiF was retained at 1:1.6.
2. Hydrochloric acid solution (9 M) was added to a HDPE screw cap bottle and placed in a water bath set to 35°C. A PTFE stir bar was added, and the stirring was set to 200 RPM.
3. Slowly, lithium fluoride was slowly added to the HCl solution using a spatula or spoon made from stainless steel or polylactic acid resin sampling spoons (constructed with a resistance equivalent to polypropylene). When 1.6 ±0.05 g of LiF was used, the addition time was typically 5 minutes. This addition time was extended when larger quantities of LiF were used.
4. Subsequently, the MAX phase, titanium aluminium carbide, was added slowly to the solution. This was approximately 5 minutes when 1 ±0.05 g of MAX phase was used. Larger quantities required longer addition times. The stir speed was increased to

350 rpm. The lid of the HDPE bottle was screwed on loosely to avoid pressure build-up. The reaction was left to proceed for 24 hours.
5. Following 24 hours, the MXene solution was carefully pipetted from the HDPE containers using a 10.0 ml low-density polyethylene transfer pipette and placed in 50 ml centrifuge tubes filled with an average of 20.0 ml DI water (the exact quantity of DI water was dependent on the quantity of MXene being produced and ranged from 15.0 ml to 35.0 ml.
6. The centrifuge tubes filled with MXene and DI water were centrifuged for 7 minutes at 3500 rpm.
7. The acidic supernatant was pipetted out from the centrifuge tube, further DI water was added, and the process was repeated until the supernatant reached a pH $\geq$ 6.
8. After this, DI water was added to the sediment, sonicated for 60 minutes, and then centrifuged for 30 minutes at 6000 RPM.
9. The supernatant was decanted, and the sediment was collected and freezedried (Christ, Alpha 2-4 LSCbasic freeze dryer) at -88.8°C and 0.0378 mbar for 240 hours.
10. As detailed in the individual experiments, the synthesised MXene powder was added to DI water to create MXene ink of varying concentrations.

Supplementary information 2 UV-visible spectrophotometry spectrum of MXene solution



Supplementary information 3: Descriptive statistics and frequencies of XRF elemental analysis data of a selection of plasma treated MC-fabrics

Descriptive Statistics

				Bootstrap[a]			
						95% Confidence Interval	
		Statistic	Std. Error	Bias	Std. Error	Lower	Upper
Ti_percent	N	6		0	0	6	6
	Minimum	82					
	Maximum	89					
	Mean	85.785		.038	.610	84.653	86.917
	Std. Deviation	2.6969		-.0835	.1744	2.3205	2.9961
	Skewness	-.01	.85	-.06	.83	-1.69	1.70
	Kurtosis	-1.84	1.74	1.33	1.76	-2.84	4.07
Al_percent	N	6.0		.0	.0	6.0	6.0
	Minimum	8.2					
	Maximum	12.0					
	Mean	9.718		-.019	.274	9.21	10.22
	Std. Deviation	1.3785		-.032	.126	1.08	1.55
	Skewness	.81	.85	.17	.48	.24	2.02
	Kurtosis	.33	1.74	.83	1.24	-.55	4.59
Si_percent	N	6.0		.0	.0	6.0	6.0
	Minimum	1.9					
	Maximum	3.2					
	Mean	2.450		-.007	.150	2.19	2.74
	Std. Deviation	.5863		-.026	.053	.476	.645
	Skewness	.52	.85	.11	.88	-.98	2.35
	Kurtosis	-2.11	1.74	1.66	2.44	-3.19	5.65
Ca_percent	N	6.0		.0	.0	6.0	6.0
	Minimum	.2					
	Maximum	1.5					
	Mean	.910		-.005	.077	.760	1.060
	Std. Deviation	.5201		-.013	.057	.369	.592
	Skewness	-.40	.85	-.11	.26	-1.01	-.05
	Kurtosis	-1.64	1.74	.22	.44	-2.03	-.26
Fe_percent	N	6.0		.0	.0	6.0	6.0
	Minimum	.1					
	Maximum	.4					
	Mean	.262		-.001	.019	.232	.303
	Std. Deviation	.1280		-.0036	.0180	.0964	.1572
	Skewness	-.27	.85	-.25	.30	-.96	-.04
	Kurtosis	-1.25	1.74	-.32	.37	-2.08	-.80
Cu_percent	N	6.0		.0	.0	6.0	6.0
	Minimum	.1					
	Maximum	.3					
	Mean	.167		.000	.004	.158	.175
	Std. Deviation	.0520		-.0003	.0021	.0472	.0551
	Skewness	2.16	.85	.05	.08	2.10	2.41
	Kurtosis	4.91	1.74	.18	.29	4.67	5.84
Zn_percent	N	6.0		.0	.0	6.0	6.0
	Minimum	.0					
	Maximum	.1					
	Mean	.048		.000	.003	.043	.053
	Std. Deviation	.0382		-.0002	.0021	.0339	.0413

	Skewness	-.81	.85	-.03	.07	-.97	-.72
	Kurtosis	-1.91	1.74	.03	.04	-1.95	-1.73
Hf_percent	N	6.0		.0	.0	6.0	6.0
	Minimum	.0					
	Maximum	.2					
	Mean	.038		-.001	.034	.000	.115
	Std. Deviation	.0939		-.025	.051	.000	.126
	Skewness	2.45	.85	-.67[b]	.87[b]	.00[b]	2.45[b]
	Kurtosis	6.00	1.74	-3.25[b]	4.01[b]	-3.33[b]	6.00[b]
S_percent	N	6.0		.0	.0	6.0	6.0
	Minimum	.0					
	Maximum	1.4					
	Mean	.543		-.007	.100	.350	.717
	Std. Deviation	.5245		-.011	.043	.437	.581
	Skewness	.57	.85	.12	.52	-.27	1.71
	Kurtosis	-.08	1.74	.87	1.18	-.82	3.06
Co_percent	N	6.0		.0	.0	6.0	6.0
	Minimum	.0					
	Maximum	.2					
	Mean	.027		.000	.000	.027	.027
	Std. Deviation	.0653		.0000	.0000	.0653	.0653
	Skewness	2.45	.85	.00	.00	2.45	2.45
	Kurtosis	6.0	1.74	.00	.00	6.00	6.00
Zr_percent	N	6		.0	.0	6.0	6.0
	Minimum	0					
	Maximum	0					
	Mean	.007		.000	.003	.003	.013
	Std. Deviation	.0103		-.001	.001	.008	.011
	Skewness	.97	.85	.15	1.04	-.97	2.45
	Kurtosis	-1.88	1.74	2.15	3.92	-3.33	6.00
Cr_percent	N	6.0		.0	.0	6.0	6.0
	Minimum	.0					
	Maximum	.2					
	Mean	.025		.000	.000	.025	.025
	Std. Deviation	.0612		.000	.000	.061	.061
	Skewness	2.45	.85	.00	.00	2.45	2.45
	Kurtosis	6.00	1.74	.00	.00	6.00	6.00
Pd_percent	N	6.0		.0	.0	6.0	6.0
	Minimum	.0					
	Maximum	.1					
	Mean	.023		.000	.020	.000	.070
	Std. Deviation	.057		-.0136	.0302	.0000	.0767
	Skewness	2.45	.85	-.67[c]	.85[c]	.00[c]	2.45[c]
	Kurtosis	6.00	1.74	-3.26[c]	4.01[c]	-3.33[c]	6.00[c]
Ni_percent	N	6.0		.0	.0	6.0	6.0
	Minimum	.0					
	Maximum	.0					
	Mean	.000		.000	.000	.000	.000
	Std. Deviation	.000		.000	.000	.000	.000
	Skewness	.	.	.[d]	.[d]	.[d,e]	.[d,e]
	Kurtosis	.	.	.[d]	.[d]	.[d,e]	.[d,e]
Ag_percent	N	6.0		.0	.0	6.0	6.0
	Minimum	.0					

	Maximum	.0					
	Mean	.000		.000	.000	.000	.000
	Std. Deviation	.000		.000	.000	.000	.000
	Skewness	.	.	.[d]	.[d]	.[d,e]	.[d,e]
	Kurtosis	.	.	.[d]	.[d]	.[d,e]	.[d,e]
Valid N (listwise)	N	6		0	0	6	6

a. Unless otherwise noted, bootstrap results are based on 1000 stratified bootstrap samples
b. Based on 659 samples
c. Based on 686 samples
d. Based on 0 samples
e. A 95% confidence interval requires at least 39 bootstrap samples.

Supplementary information 5: Bootstrap specifications of untreated MC fabrics

Bootstrap Specifications

Sampling Method	Simple
Number of Samples	1000
Confidence Interval Level	95.0%
Confidence Interval Type	Percentile

Supplementary information 6: Descriptive Statistics and Frequencies for the electrical resistance of non-plasma treated MC fabrics

Statistics

			Bootstrap[a]			
					95% Confidence Interval	
		Statistic	Bias	Std. Error	Lower	Upper
N	Valid	Wool	9	0	0	9	9
		Nylon	9	0	0	9	9
		Polyester	9	0	0	9	9
		Linen	9	0	0	9	9
	Missing	Wool	0	0	0	0	0
		Nylon	0	0	0	0	0
		Polyester	0	0	0	0	0
		Linen	0	0	0	0	0
Mean		Wool	556080244.44	-3435198.83	164104798.52	222797716.28	888895588.89
		Nylon	632133.33	13539.11	447466.80	21069.80	1571617.58
		Polyester	2574.11	2.29	618.83	1425.46	3908.97
		Linen	109352.22	3068.10	90067.79	9277.81	300393.04
Median		Wool	1000000000.00	-378936130.80	484271524.27	60300.00	1000000000.00
		Nylon	7000.00	78208.78	359302.29	579.00	1300000.00
		Polyester	1437.00	788.36	1326.90	835.00	4970.00
		Linen	14300.00	4882.61	60353.15	1910.00	43500.00
Std. Deviation		Wool	526425816.83	-32033926.27	53358071.85	333294333.33	527011766.13
		Nylon	1403169.53	-216875.24	623618.20	40197.46	2084644.80
		Polyester	1939.18	-138.11	267.00	1209.21	2167.60
		Linen	281865.21	-59483.38	152545.02	9139.62	425675.01

Variance	Wool	277124140623570272.0	-29856562428849664.0	43343532285705840.0	111085112632111104.0	27774140163538944 0.0
	Nylon	1968884724425.7	-173079836363.5	1323763293843.5	1615838569.5	4345743936427.9
	Polyester	3760431.9	-445354.1	866127.2	1462199.9	4698492.3
	Linen	79447999194.4	-6747604033.4	59114985588.1	83532641.5	181199227088.6
Skewness	Wool	-.27	-.03[b]	.99[b]	-3.00[b]	1.62[b]
	Nylon	2.57	-.51	.83	.27	3.00
	Polyester	.40	.03	.87	-1.33	2.61
	Linen	2.98	-1.10	1.03	-.19	3.00
Std. Error of Skewness	Wool	.72				
	Nylon	.72				
	Polyester	.72				
	Linen	.72				
Kurtosis	Wool	-2.57	1.30[b]	2.50[b]	-2.57[b]	9.00[b]
	Nylon	6.71	-2.55	4.07	-2.09	8.99
	Polyester	-2.01	1.10	2.14	-2.50	7.50
	Linen	8.93	-5.17	4.48	-2.21	8.99
Std. Error of Kurtosis	Wool	1.40				
	Nylon	1.40				
	Polyester	1.40				
	Linen	1.40				
Range	Wool	999955100.0				
	Nylon	4199478.0				
	Polyester	4730.0				
	Linen	858580.0				
Minimum	Wool	44900.0				
	Nylon	522.0				
	Polyester	450.0				
	Linen	1420.0				
Maximum	Wool	1000000000.0				
	Nylon	4200000.0				
	Polyester	5180.0				
	Linen	860000.0				
Percentiles 25	Wool	88650.00	99704598.60	244387832.77	44900.00	1000000000.00
	Nylon	669.00	3808.79	42228.70	522.00	35650.00
	Polyester	994.00	57.70	490.00	450.00	2403.50
	Linen	2125.00	2911.32	4683.35	1420.00	14750.00
50	Wool	1000000000.00	-378936130.80	484271524.27	60300.00	1000000000.00

	Nylon	7000.00	78208.78	359302.29	579.00	1300000.00
	Polyester	1437.00	788.36	1326.90	835.00	4970.00
	Linen	14300.00	4882.61	60353.15	1910.00	43500.00
75	Wool	1000000000.00	-24413856.50	124716448.92	502250000.00	1000000000.00
	Nylon	707500.00	456091.38	1244999.23	7000.00	4200000.00
	Polyester	4785.00	-506.62	988.01	1437.00	5180.00
	Linen	38500.00	135521.44	253526.62	13600.00	860000.00

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

b. Based on 997 samples

Supplementary information 6: coating characteristics and electrical resistance results

Run	Run no.	Fabric	Gas	Power (w)	SCCM	Time (s)	Initial Weight (g)	Padded weight (g)	% pick up	R1a	R1b	R1c	R1f1	R1f2	R2a	R2b	R2c	R2f1	R2F2	R3a	R3b	R3c	R3F1	R3F2	Mean	Folded Mean	Median R
1	1	Linen	Air	100	10	120	0.065	0.114	75.38	955	1280	2280	1921	3447	298	442	448	1127	2700	428	376	368	1352	5500	763.89	2674.50	442.00
2	1	Linen	Air	200	30	30	0.068	0.121	77.94	359	128	685	715	1755	174	258	336	467	1076	433	413	689	914	2445	386.11	1228.67	359.00
3	2	Linen	Air	100	10	120	0.067	0.117	74.63																		
4	2	Linen	Air	200	30	30	0.061	0.108	77.05																		
5	3	Linen	Air	100	10	120	0.068	0.123	80.88																		
6	3	Linen	Air	200	30	30	0.061	0.107	75.41																		
7	1	Nylon	Air	100	10	120	0.061	0.109	78.69	25	55	47	55	64	13	15	12	14	21	22	21	29	18	27	26.56	33.17	22.00
8	1	Nylon	Air	200	30	30	0.068	0.122	79.41	33	36	40	55	158	15	24	36	28	47	20	19	17	21	36	26.67	57.50	24.00
9	2	Nylon	Air	100	10	120	0.064	0.111	73.44																		
10	2	Nylon	Air	200	30	30	0.063	0.113	79.37																		
11	3	Nylon	Air	100	10	120	0.061	0.109	78.69																		
12	3	Nylon	Air	200	30	30	0.065	0.116	78.46																		
13	1	Polyest	Air	100	10	120	0.062	0.109	75.81	44	82	41	87	136	21	33	57	56	74	20	38	42	46	83	42.00	80.33	41.00
14	1	Polyest	Air	200	30	30	0.065	0.116	78.46	39	38	31	41	75	21	18	30	19	16	17	23	23	26	38	26.67	35.83	23.00
15	2	Polyest	Air	100	10	120	0.068	0.121	77.94																		
16	2	Polyest	Air	200	30	30	0.061	0.106	73.77																		
17	3	Polyest	Air	100	10	120	0.064	0.116	81.25																		
18	3	Polyest	Air	200	30	30	0.062	0.108	74.19																		

19	1	Wool	Air	100	10	120	0.064	0.116	81.25	4550	6350	5250	7320	16500	1165	1925	1650	2800	4000	728	1360	2040	1200	2600	2779.78	5736.67	1925.00
20	1	Wool	Air	200	30	30	0.064	0.114	78.13	7400	8990	6150	22100	34000	1940	8300	6900	9950	12600	211	300	416	475	700	4511.89	13304.17	6150.00
21	2	Wool	Air	100	10	120	0.065	0.117	80.00																		
22	2	Wool	Air	200	30	30	0.063	0.112	77.78																		
23	3	Wool	Air	100	10	120	0.068	0.123	80.88																		
24	3	Wool	Air	200	30	30	0.066	0.116	75.76																		
25	1	Linen	Arg	100	10	30	0.061	0.109	78.69	402	458	420	1198	2810	136	142	202	300	1190	118	298	277	438	1688	272.56	1270.67	277.00
26	1	Linen	Arg	200	30	120	0.063	0.11	74.60	95	168	132	330	862	131	200	219	375	690	43	65	98	234	526	127.89	502.83	131.00
27	2	Linen	Arg	100	10	30	0.061	0.106	73.77																		
28	2	Linen	Arg	200	30	120	0.061	0.109	78.69																		
29	3	Linen	Arg	100	10	30	0.063	0.111	76.19																		
30	3	Linen	Arg	200	30	120	0.067	0.117	74.63																		
31	1	Nylon	Arg	100	10	30	0.061	0.106	73.77	158	300	250	400	660	126	164	221	174	298	40	49	48	36	75	150.67	273.83	158.00
32	1	Nylon	Arg	200	30	120	0.063	0.109	73.02	23	32	36	37	68	40	47	77	81	173	65	45	105	70	75	52.22	84.00	45.00
33	2	Nylon	Arg	100	10	30	0.063	0.111	76.19																		
34	2	Nylon	Arg	200	30	120	0.064	0.114	78.13																		
35	3	Nylon	Arg	100	10	30	0.064	0.111	73.44																		
36	3	Nylon	Arg	200	30	120	0.062	0.108	74.19																		
37	1	Polyest	Arg	100	10	30	0.062	0.107	72.58	29	35	22	37	48	18	21	13	17	22	18	19	36	22	34	23.44	30.00	21.00
38	1	Polyest	Arg	200	30	120	0.062	0.109	75.81	159	98	450	335	1000	87	105	200	140	206	74	90	200	190	350	162.56	370.17	105.00
39	2	Polyest	Arg	100	10	30	0.067	0.12	79.10																		
40	2	Polyest	Arg	200	30	120	0.062	0.109	75.81																		
41	3	Polyest	Arg	100	10	30	0.064	0.115	79.69																		
42	3	Polyest	Arg	200	30	120	0.067	0.119	77.61																		
43	1	Wool	Arg	100	10	30	0.066	0.116	75.76	5868	3470	11300	16400	46600	3320	46000	12100	12300	18300	4420	4370	452000	10800	14300	60316.44	19783.33	5868.00
44	1	Wool	Arg	200	30	120	0.064	0.114	78.13	5400	6300	12100	19200	19200	5500	8900	4650	9370	13500	3660	3980	7165	5740	7740	6406.11	12458.33	5500.00
45	2	Wool	Arg	100	10	30	0.064	0.116	81.25																		
46	2	Wool	Arg	200	30	120	0.066	0.119	80.30																		
47	3	Wool	Arg	100	10	30	0.065	0.116	78.46																		
48	3	Wool	Arg	200	30	120	0.064	0.114	78.13																		

49	1	Linen	Oxy	100	30	120	0.065	0.117	80.00	870	1538	1740	2980	6760	1100	2730	7430	13450	38400	3070	3610	4970	15000	35000	3006.44	18598.33	2730.00
50	1	Linen	Oxy	200	10	30	0.068	0.121	77.94	2450	2490	6000	15400	51700	37000	35500	89000	75800	2,500,000	6620	8900	19300	25600	64200	23028.89	569150.00	8900.00
51	2	Linen	Oxy	100	30	120	0.066	0.119	80.30																		
52	2	Linen	Oxy	200	10	30	0.067	0.12	79.10																		
53	3	Linen	Oxy	100	30	120	0.063	0.113	79.37																		
54	3	Linen	Oxy	200	10	30	0.064	0.113	76.56																		
55	1	Nylon	Oxy	100	30	120	0.061	0.111	81.97	494	624	1040	950	1900	368	472	1140	945	1600	1100	750	3520	3100	3580	1056.44	2012.50	750.00
56	1	Nylon	Oxy	200	10	30	0.061	0.11	80.33	474	640	680	1300	2300	4530	3180	15000	20300	48400	1810	2700	3390	8060	9600	3600.44	14993.33	2700.00
57	2	Nylon	Oxy	100	30	120	0.061	0.108	77.05																		
58	2	Nylon	Oxy	200	10	30	0.066	0.114	72.73																		
59	3	Nylon	Oxy	100	30	120	0.068	0.121	77.94																		
60	3	Nylon	Oxy	200	10	30	0.068	0.117	72.06																		
61	1	Polyest	Oxy	100	30	120	0.064	0.114	78.13	295	308	356	624	1340	625	838	530	3010	6900	355000	171000	30,200,000	3,460,000	4,160,000	3414328.00	1271979.00	625.00
62	1	Polyest	Oxy	200	10	30	0.061	0.11	80.33	440	2520	1990	2140	4600	182	255	156	281	468	726	595	426	726	2870	810.00	1847.50	440.00
63	2	Polyest	Oxy	100	30	120	0.062	0.111	79.03																		
64	2	Polyest	Oxy	200	10	30	0.066	0.119	80.30																		
65	3	Polyest	Oxy	100	30	120	0.064	0.113	76.56																		
66	3	Polyest	Oxy	200	10	30	0.063	0.112	77.78																		
67	1	Wool	Oxy	100	30	120	0.064	0.114	78.13	1688	2985	2770	5400	8845	1030	1040	1180	1500	2280	913	1340	1920	1630	2170	1651.78	3637.50	1340.00
68	1	Wool	Oxy	200	10	30	0.067	0.118	76.12	4000	5590	6510	13000	14000	860	780	1450	1660	2900	1350	1200	3370	1360	1870	2790.00	5798.33	1450.00
69	2	Wool	Oxy	100	30	120	0.063	0.111	76.19																		
70	2	Wool	Oxy	200	10	30	0.067	0.12	79.10																		
71	3	Wool	Oxy	100	30	120	0.065	0.117	80.00																		
72	3	Wool	Oxy	200	10	30	0.065	0.114	75.38																		
73		Linen	None(2.75M)	-	-	-	0.066	0.15	127.27	96	116	207	311	623											139.67	467.00	116.00
74		Linen					0.068		-																		
75		Wool	None				0.068	0.119	75.00	60300	44900	117000	133000	247000											74066.67	190000.00	60300.00
76		Wool					0.067		-																		

77		Nylon	None				0.061	0.107	75.41	579	522	759	718	882											620.00	800.00	579.00
78		Nylon					0.068		-																		
79		Polyest	None				0.067	0.115	71.64	1172	1153	1437	1150	1178											1254.00	1164.00	1172.00
80		Polyest					0.061		-																#DIV/0!	#DIV/0!	
81		Linen	None (2 M coating)				0.063	0.109	73.02	12000	14300	15200	16800	31000											13833.33	23900.00	14300.00
82	1	Linen	HxFE	100	10	120	0.061	0.108	77.05	1550	2080	1925	4195	6230	1045	757	1887	4200	11200	5500	5700	11200	18600	47000	3516.00	15237.50	1925.00
83	1	Linen	HxFE	200	30	30	0.068	0.121	77.94	11250	41600	8730	502000	530000	2500	1910	3490	2450	7020	2850	3010	3020	29500	85000	8706.67	987661.67	3020.00
84	2	Linen	HxFE	100	10	120	0.064	0.115	79.69																		
85	2	Linen	HxFE	200	30	30	0.064	0.114	78.13																		
86	3	Linen	HxFE	100	10	120	0.064	0.114	78.13																		
87	3	Linen	HxFE	200	30	30	0.066	0.118	78.79																		
88	1	Nylon	HxFE	100	10	120	0.066	0.116	75.76	1570	3650	1550	2030	12500	1760	1300	5100	42500	234000	310	622	631	4800	46400	1832.56	57038.33	1550.00
89	1	Nylon	HxFE	200	30	30	0.066	0.116	75.76	227	243	611	478	6260	335	534	800	751	2700	190	97	89	323	511	347.33	1837.17	243.00
90	2	Nylon	HxFE	100	10	120	0.068	0.118	73.53																		
91	2	Nylon	HxFE	200	30	30	0.064	0.113	76.56																		
92	3	Nylon	HxFE	100	10	120	0.064	0.111	73.44																		
93	3	Nylon	HxFE	200	30	30	0.065	0.113	73.85																		
94	1	Polyest	HxFE	100	10	120	0.067	0.116	73.13	402	306	1270	805	2700	342	600	3820	1515	5150	1030	762	2470	5700	6830	1222.44	3783.33	762.00
95	1	Polyest	HxFE	200	30	30	0.067	0.117	74.63	1400	217	1500	1540	1900	365	238	386	2100	4790	1320	1260	2940	3610	12190	1069.56	4355.00	1260.00
96	2	Polyest	HxFE	100	10	120	0.068	0.121	77.94																		
97	2	Polyest	HxFE	200	30	30	0.061	0.106	73.77																		
98	3	Polyest	HxFE	100	10	120	0.067	0.121	80.60																		
99	3	Polyest	HxFE	200	30	30	0.062	0.108	74.19																		
100	1	Wool	HxFE	100	10	120	0.062	0.107	72.58	225	228	502	497	905	345	931	2100	3680	5360	175	302	436	538	835	582.67	1969.17	345.00
101	1	Wool	HxFE	200	30	30	0.061	0.111	81.97	6420	17400	20200	27200	66500	3265	3030	7100	8030	11700	5220	14400	53000	72000	80600	14448.33	44338.33	7100.00
102	2	Wool	HxFE	100	10	120	0.067	0.116	73.13																		
103	2	Wool	HxFE	200	30	30	0.065	0.116	78.46																		
104	3	Wool	HxFE	100	10	120	0.063	0.113	79.37																		

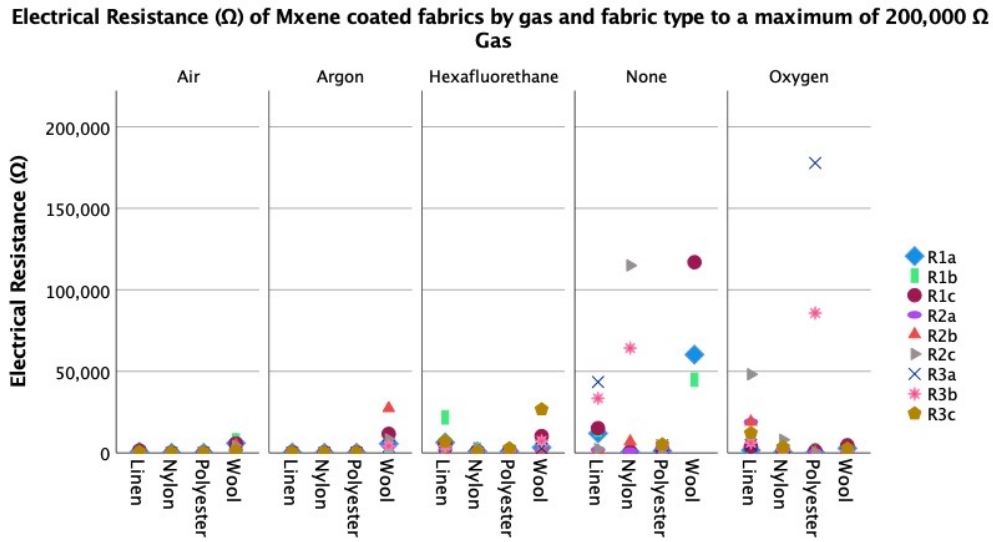
105	3	Wool	HxFE	200	30	30	0.063	0.114	80.95

Supplementary information 7: Descriptive statistics and frequencies of electrical resistance results for each parameter

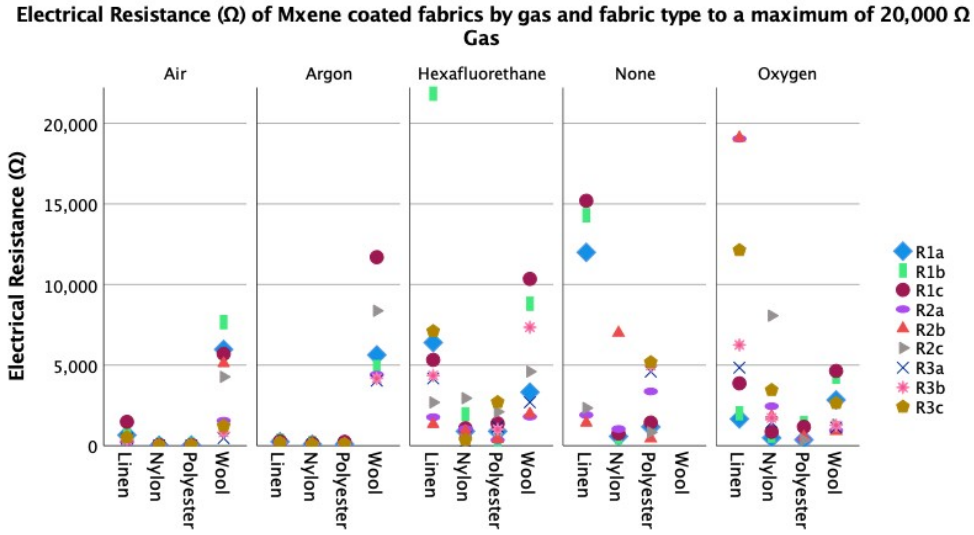
Variable	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum	Range	IQR	Skewness	Kurtosis
L / Air / 100 / 10 / 120	1528	377	1461	298	428	1127	2280	5500	5202	1852	1.66	2.86
L / Air / 200 / 30 / 30	723	163	632	128	336	467	914	2445	2317	578	1.83	3.30
N / Air / 100 / 10 / 120	29.20	4.46	17.29	12.00	15.00	22.00	47.00	64.00	52.00	32.00	1.01	-0.41
N / Air / 200 / 30 / 30	39.00	9.01	34.88	15.00	20.00	33.00	40.00	158.00	143.00	20.00	3.18	11.19
P / Air / 100 / 10 / 120	57.33	7.90	30.59	20.00	38.00	46.00	82.00	136.00	116.00	44.00	1.20	1.79
P / Air / 200 / 30 / 30	30.33	3.89	15.07	16.00	19.00	26.00	38.00	75.00	59.00	19.00	1.96	5.04
W / Air / 100 / 10 /120	3963	1036	4011	728	1360	2600	5250	16500	15772	3890	2.42	6.93
W / Air / 200 / 30 / 30	8029	2420	9373	211	475	6900	9950	34000	33789	9475	1.80	3.53
L / Arg / 100 / 10 / 120	672	194	752	118	202	402	1190	2810	2692	988	2.00	3.96
L / Arg / 200 / 30 / 30	277.9	62.4	241.6	43.0	98.0	200.0	375.0	862.0	819.0	277.0	1.42	1.31
N / Arg / 100 / 10 / 30	199.9	43.5	168.5	36.0	49.0	164.0	298.0	660.0	624.0	249.0	1.54	2.96
N / Arg / 200 / 30 / 120	64.93	9.67	37.44	23.00	37.00	65.00	77.00	173.00	150.00	40.00	1.80	4.36
P / Arg / 100 / 10 / 30	26.07	2.54	9.85	13.00	18.00	22.00	35.00	48.00	35.00	17.00	0.81	-0.10
P / Arg / 200 / 30 / 120	245.6	60.9	235.7	74.0	98.0	190.0	335.0	1000.0	926.0	237.0	2.64	7.95
W / Arg / 100 / 10 / 30	44103	29347	113660	3320	4420	12100	18300	452000	448680	13880	3.78	14.47
W / Arg / 200 / 30 / 120	8827	1306	5059	3660	5400	7165	12100	19200	15540	6700	1.22	0.54
L / Oxy / 100 / 30 / 120	9243	3083	11939	870	1740	3610	13450	38400	37530	11710	1.89	2.65
L / Oxy / 200 / 10 / 30	241477	168589	652943	2450	6620	25600	64200	2500000	2497550	57580	3.41	12.02
N / Oxy / 100 / 30 / 120	1439	283	1098	368	624	1040	1900	3580	3212	1276	1.20	0.11
N / Oxy / 200 / 10 / 30	8158	3236	12534	474	1300	3180	9600	48400	47926	8300	2.71	8.09
P / Oxy / 100 / 30 / 120	2557388	2004007	7761485	295	530	1340	355000	30200000	30199705	354470	3.69	13.93
P / Oxy / 200 / 10 / 30	1225	338	1309	156	281	595	2140	4600	4444	1859	1.48	1.72
W / Oxy / 100 / 30 / 120	2446	542	2100	913	1180	1688	2770	8845	7932	1590	2.43	6.24
W / Oxy / 200 / 10 / 30	3993	1091	4226	780	1350	1870	5590	14000	13220	4240	1.74	2.13
L / Hx / 100 / 10 / 120	8205	3046	11798	757	1887	4200	11200	47000	46243	9313	2.89	9.22

L / Hx / 200 / 30 / 30	400289	351518	1361424	1910	2850	7020	41600	5300000	5298090	38750	3.82	14.68
N / Hx / 100 / 10 / 120	23915	15487	59982	310	1300	2030	12500	234000	233690	11200	3.50	12.79
N / Hx / 200 / 30 / 30	943	413	1601	89	227	478	751	6260	6171	524	3.07	9.81
P / Hx / 100 / 10 / 120	2247	556	2152	306	600	1270	3820	6830	6524	3220	1.09	-0.08
P / Hx / 200 / 30 / 30	2384	776	3004	217	386	1500	2940	12190	11973	2554	2.79	8.87
W / Hx / 100 / 10 / 120	1137	384	1488	175	302	502	931	5360	5185	629	2.20	4.41
W / Hx / 200 / 30 / 30	26404	7055	27323	3030	6420	14400	53000	80600	77570	46580	1.11	-0.36

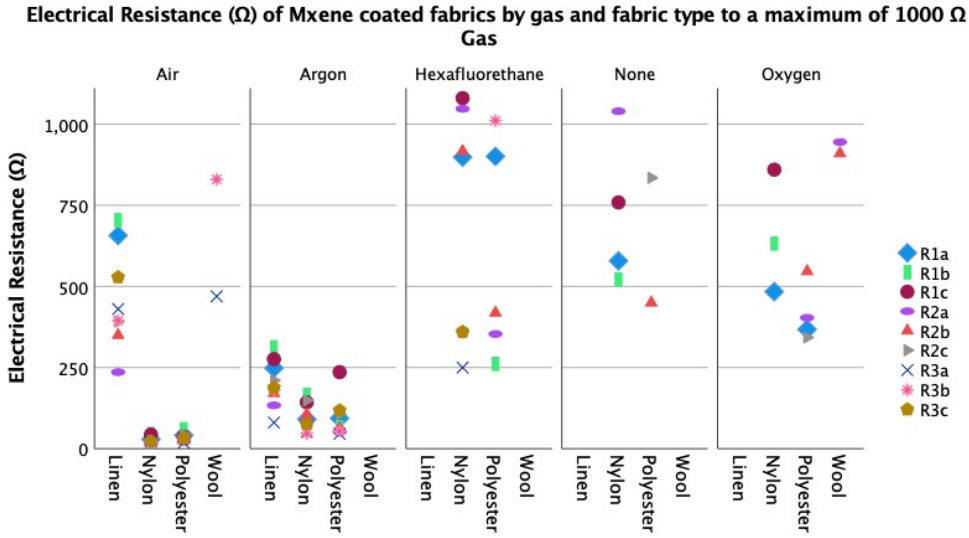
Supplementary information 8: Electrical resistance of MC fabrics by gas type to 200 kiloohm



Supplementary information 9: electrical resistance of MC fabrics by gas type to 20 kiloohm



Supplementary information 10: electrical resistance of MC fabrics by gas type to 1000 Ω



Nylon

Supplementary information 11: Bootstrap specifications for Nylon

Bootstrap Specifications

Sampling Method	Simple
Number of Samples	1000
Confidence Interval Level	95.0%
Confidence Interval Type	Percentile

Supplementary information 12: Descriptive statistics and frequencies for MC coated Nylon by each parameter, following bootstrapping

Bootstrapped Statistics

				Bootstrap[a]			
						95% Confidence Interval	
			Statistic	Bias	Std. Error	Lower	Upper
N	Valid	Air10010120	9	0	0	9	9
		Air2003030	9	0	0	9	9
		Arg1001030	9	0	0	9	9
		Arg20030120	9	0	0	9	9
		Oxy10030120	9	0	0	9	9
		Oxy2001030	9	0	0	9	9
		HxFE10010120	9	0	0	9	9
		HxFE2003030	9	0	0	9	9
	Missing	Air10010120	0	0	0	0	0
		Air2003030	0	0	0	0	0
		Arg1001030	0	0	0	0	0
		Arg20030120	0	0	0	0	0
		Oxy10030120	0	0	0	0	0
		Oxy2001030	0	0	0	0	0
		HxFE10010120	0	0	0	0	0

	HxFE2003030	0	0	0	0	0
Mean	Air10010120	26.6	.3	4.9	17.9	36.8
	Air2003030	26.7	.1	3.0	20.8	32.9
	Arg1001030	150.7	.1	30.4	92.7	210.0
	Arg20030120	52.2	-.2	8.2	37.8	69.4
	Oxy10030120	1056.4	1.6	305.6	608.9	1764.4
	Oxy2001030	3600.4	-77.7	1458.7	1416.0	6880.7
	HxFE10010120	1832.6	-17.3	489.1	960.7	2893.6
	HxFE2003030	347.3	-2.0	79.4	202.3	507.2
Median	Air10010120	22.0	1.2	6.3	13.0	47.0
	Air2003030	24.0	2.1	6.6	17.0	36.0
	Arg1001030	158.0	-12.1	52.1	48.0	250.0
	Arg20030120	45.0	1.2	10.1	32.0	76.7
	Oxy10030120	750.0	57.9	233.6	472.6	1139.0
	Oxy2001030	2700.0	-288.5	1061.3	640.0	4530.0
	HxFE10010120	1550.0	-103.0	529.9	622.0	3650.0
	HxFE2003030	243.0	47.5	119.1	97.0	534.0
Std. Deviation	Air10010120	15.07	-1.27	3.49	5.40	19.02
	Air2003030	9.57	-.61	1.20	6.35	10.94
	Arg1001030	94.26	-6.17	15.33	54.32	114.84
	Arg20030120	25.78	-2.50	6.50	8.81	33.98
	Oxy10030120	967.67	-153.77	406.14	219.99	1438.44
	Oxy2001030	4501.66	-814.76	1905.14	1014.94	6608.92
	HxFE10010120	1567.02	-164.91	423.85	501.37	2047.92
	HxFE2003030	247.22	-21.17	50.25	105.94	307.49
Skewness	Air10010120	1.14	-.16	.74	-.42	2.42
	Air2003030	.18	.02	.79	-1.38	1.95
	Arg1001030	.22	-.05	.61	-1.04	1.52
	Arg20030120	1.17	-.25	.70	-.41	2.39
	Oxy10030120	2.51	-1.07	1.11	-.66	2.79
	Oxy2001030	2.46	-1.13	1.10	-.67	2.75
	HxFE10010120	1.41	-.29	.78	-.76	2.46
	HxFE2003030	.83	-.09	.68	-.49	2.27
Std. Error of Skewness	Air10010120	.72				
	Air2003030	.72				
	Arg1001030	.72				
	Arg20030120	.72				
	Oxy10030120	.72				
	Oxy2001030	.72				
	HxFE10010120	.72				
	HxFE2003030	.72				
Kurtosis	Air10010120	.25	.29	2.55	-2.26	6.44
	Air2003030	-1.98	.85	1.64	-2.37	5.04
	Arg1001030	-1.22	.42	1.20	-2.23	2.19
	Arg20030120	.98	-.35	2.18	-2.07	6.47
	Oxy10030120	6.83	-4.37	4.01	-2.38	7.98
	Oxy2001030	6.61	-4.43	3.80	-2.39	7.95
	HxFE10010120	1.41	-.37	2.63	-2.20	6.62
	HxFE2003030	-.46	.29	2.02	-2.27	5.80
Std. Error of Kurtosis	Air10010120	1.40				
	Air2003030	1.40				
	Arg1001030	1.40				
	Arg20030120	1.40				
	Oxy10030120	1.40				

		Oxy2001030	1.40				
		HxFE10010120	1.40				
		HxFE2003030	1.40				
Minimum		Air10010120	12.0				
		Air2003030	15.0				
		Arg1001030	40.0				
		Arg20030120	23.0				
		Oxy10030120	368.0				
		Oxy2001030	474.0				
		HxFE10010120	310.0				
		HxFE2003030	89.0				
Maximum		Air10010120	55.0				
		Air2003030	40.0				
		Arg1001030	300.0				
		Arg20030120	105.0				
		Oxy10030120	3520.0				
		Oxy2001030	15000.0				
		HxFE10010120	5100.0				
		HxFE2003030	800.0				
Percentiles	25	Air10010120	14.00	1.94	3.46	12.00	23.00
		Air2003030	18.00	.68	2.82	15.00	26.50
		Arg1001030	48.50	21.85	36.57	40.00	161.00
		Arg20030120	34.00	.49	5.71	23.00	46.00
		Oxy10030120	483.00	43.44	120.81	368.00	895.00
		Oxy2001030	660.00	369.83	633.31	474.00	2700.00
		HxFE10010120	626.50	138.92	335.22	310.00	1550.00
		HxFE2003030	143.50	14.90	61.14	89.00	289.00
	50	Air10010120	22.00	1.25	6.29	13.00	47.00
		Air2003030	24.00	2.05	6.58	17.00	36.00
		Arg1001030	158.00	-12.09	52.13	48.00	250.00
		Arg20030120	45.00	1.23	10.07	32.00	76.70
		Oxy10030120	750.00	57.93	233.55	472.56	1138.98
		Oxy2001030	2700.00	-288.47	1061.26	640.00	4530.00
		HxFE10010120	1550.00	-102.97	529.86	622.00	3650.00
		HxFE2003030	243.00	47.51	119.12	97.00	534.00
	75	Air10010120	38.00	-.11	10.60	21.50	55.00
		Air2003030	36.00	-1.03	3.87	22.00	40.00
		Arg1001030	235.50	-8.21	43.06	142.00	300.00
		Arg20030120	71.00	-1.34	16.87	42.50	105.00
		Oxy10030120	1120.00	333.40	752.66	750.00	3520.00
		Oxy2001030	3960.00	1444.82	3452.65	2255.00	15000.00
		HxFE10010120	2705.00	97.90	1103.36	1425.00	5100.00
		HxFE2003030	572.50	-34.91	147.33	243.00	800.00

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

Supplementary information 13: Response table for Nylon means based on median electrical resistance

Level	Gas	Power (W)	SCCM	Time
1	23.00	620.00	780.75	1108.00
2	101.50	753.00	592.25	265.00
3	896.50			

4	1725.00			
Delta	1702.00	133.00	188.50	843.00

Nominal is best (10×Log10(Ybar^2/s^2))

Supplementary information 14: Response table for Nylon Signal to Noise Ratios

Level	Gas	Power (W)	SCCM	Time
1	*	*	*	*
2	*	*	*	*
3	*			
4	*			
Delta	*	*	*	*
Rank	2.5	2.5	2.5	2.5

Supplementary information 15 Wilcoxon Signed Rank Tests for Nylon parameters compared by gas type.

	Air2003030 - Air10010120	Arg20030120 - Arg1001030	Oxy2001030 - Oxy10030120	HxFE2003030 - HxFE10010120
Z	-.059b	-2.073b	-1.599c	-2.666b
Asymp. Sig. (2-tailed)	(2-.953	.038	.110	.008

a. Wilcoxon Signed Ranks Test b. Based on positive ranks. c. Based on negative ranks.

$H_{N[3\text{-}6]0}$: The plasma treatment parameters have no effect on the electrical resistance of [GAS] treated MC nylon.
Mood's median
H_{N10}: Plasma gas type used has no effect on the electrical resistance of MXene-coated nylon.

Wilcoxon signed rank test results for non-plasma treated MC nylon vs air10010120 treated MC nylon

Test Statistics

	NoPlasma - Air10010120
Z	-2.666b
Asymp. Sig. (2-tailed)	.008

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

H_{N70}: Air plasma gas treatment with parameters (P100, S10, T120) has no effect on the electrical resistance of MC nylon.

Wilcoxon Signed Rank test ranks for Nylon plasma treatment parameters compared by gas type

Ranks

		N	Mean Rank	Sum of Ranks
Air2003030 - Air10010120	Negative Ranks	5[a]	4.60	23.00
	Positive Ranks	4[b]	5.50	22.00
	Ties	0[c]		
	Total	9		

Arg20030120 - Arg1001030	Negative Ranks	7[d]	5.71	40.00
	Positive Ranks	2[e]	2.50	5.00
	Ties	0[f]		
	Total	9		
Oxy2001030 - Oxy10030120	Negative Ranks	3[g]	3.00	9.00
	Positive Ranks	6[h]	6.00	36.00
	Ties	0[i]		
	Total	9		
HxFE2003030 - HxFE10010120	Negative Ranks	9[j]	5.00	45.00
	Positive Ranks	0[k]	.00	.00
	Ties	0[l]		
	Total	9		

a. Air2003030 < Air10010120, b. Air2003030 > Air10010120, c. Air2003030 = Air10010120, d. Arg20030120 < Arg1001030, e. Arg20030120 > Arg1001030, f. Arg20030120 = Arg1001030, g. Oxy2001030 < Oxy10030120, h. Oxy2001030 > Oxy10030120, i. Oxy2001030 = Oxy10030120, j. HxFE2003030 < HxFE10010120, k. HxFE2003030 > HxFE10010120, l. HxFE2003030 = HxFE10010120

Nylon Wilcoxon descriptive statistics

Descriptive Statistics

	N	Percentiles 25th	50th (Median)	75th
Air10010120	9	14.0000	22.0000	38.0000
NoPlasma	9	669.0000	7000.0000	707500.0000

Nylon Wilcoxon ranks

Ranks

		N	Mean Rank	Sum of Ranks
NoPlasma - Air10010120	Negative Ranks	0[a]	.00	.00
	Positive Ranks	9[b]	5.00	45.00
	Ties	0[c]		
	Total	9		

a. NoPlasma < Air10010120
b. NoPlasma > Air10010120
c. NoPlasma = Air10010120

Supplementary information 16 Mood's Median test result for Nylon.

DF	Chi-Square	P-Value
3	8.00	0.046

Gas	Median	N <= Overall Median	N > Overall Median	Q3 – Q1	95% Median CI
Air	23.0	2	0	*	(22, 24)
Argon	101.5	2	0	*	(45, 158)
HxFE	896.5	0	2	*	(243, 1550)
Oxygen	1725.0	0	2	*	(750, 2700)
Overall	200.5				

Supplementary information 18: Friedman test statistics for Nylon plasma treatment parameters.

Test Statistics

N	9
Chi-Square	54.926
df	7
Asymp. Sig.	<.001

a. Friedman Test

Ranks

	Mean Rank
Air10010120	1.89
Air2003030	1.78
Arg1001030	3.89
Arg20030120	2.67
Oxy10030120	6.56
Oxy2001030	7.33
HxFE10010120	7.00
HxFE2003030	4.89

Wool

Supplementary information 16: Wool Bootstrap specifications

Wool Bootstrap Specifications

Sampling Method	Simple
Number of Samples	1000
Confidence Interval Level	95.0%
Confidence Interval Type	Percentile

Supplementary information 17: Signal to Noise Ratios for MC wool

Level	Gas	Power (W)	SCCM	Time
1	*	*	*	*
2	*	*	*	*
3	*			
4	*			
Delta	*	*	*	*
Rank	2.5	2.5	2.5	2.5

Nominal is best (10×Log10(Ybar^2/s^2))

Supplementary information 18: Response table for means of MC wool

Level	Gas	Power (W)	SCCM	Time
1	4038	2180	7335	4925
2	5684	8300	3144	5555
3	7516			
4	3723			
Delta	3793	6119	4191	629
Rank	3	1	2	4

Supplementary information 19: MC wool descriptive statistics and frequencies by parameter post bootstrapping

Wool Descriptive Statistics and Frequencies

				Bootstrap[a]		
						95% Confidence Interval
			Statistic	Bias	Std. Error	Lower
N	Valid	Air10010120	9	0	0	9
		Air2003030	9	0	0	9
		Arg1001030	9	0	0	9
		Arg20030120	9	0	0	9
		Oxy10030120	9	0	0	9
		Oxy2001030	9	0	0	9
		HxFE10010120	9	0	0	9
		HxFE2003030	9	0	0	9
	Missing	Air10010120	0	0	0	0
		Air2003030	0	0	0	0
		Arg1001030	0	0	0	0
		Arg20030120	0	0	0	0
		Oxy10030120	0	0	0	0
		Oxy2001030	0	0	0	0
		HxFE10010120	0	0	0	0
		HxFE2003030	0	0	0	0
Mean		Air10010120	2779.8	-34.1	643.1	1492.7
		Air2003030	4511.9	-15.0	1137.5	2247.2
		Arg1001030	60316.4	-1233.9	44960.0	5567.6
		Arg20030120	6406.1	-29.1	857.5	4916.5
		Oxy10030120	1651.8	-13.2	246.7	1186.0
		Oxy2001030	2790.0	-42.7	690.7	1391.2
		HxFE10010120	582.7	5.8	189.4	293.7
		HxFE2003030	14448.3	-208.4	4817.4	6765.7
Median		Air10010120	1925.0	206.6	1018.1	1165.0
		Air2003030	6150.0	-1452.9	2678.0	300.0
		Arg1001030	5868.0	3377.8	21114.1	3470.0
		Arg20030120	5500.0	293.7	978.2	3980.0
		Oxy10030120	1340.0	89.9	373.3	1030.0
		Oxy2001030	1450.0	677.6	1206.7	868.6
		HxFE10010120	345.0	31.2	129.1	225.0

	HxFE2003030	7100.0	2690.7	5093.5	3314.7
Std. Deviation	Air10010120	2042.35	-172.93	427.70	508.17
	Air2003030	3720.88	-224.75	448.66	2445.10
	Arg1001030	147498.97	-33276.50	76982.22	2994.27
	Arg20030120	2682.62	-280.62	723.10	967.20
	Oxy10030120	768.73	-68.42	170.74	296.45
	Oxy2001030	2169.14	-183.20	432.43	819.39
	HxFE10010120	613.07	-80.68	244.18	97.13
	HxFE2003030	15760.26	-2184.26	5802.15	4248.99
Skewness	Air10010120	.9	.00	.84	-.66
	Air2003030	-.2	-.01	.82	-1.81
	Arg1001030	3.0	-.80	.90	.22
	Arg20030120	1.3	-.37	.68	-.41
	Oxy10030120	1.0	-.03	.70	-.46
	Oxy2001030	.8	.00	.75	-.66
	HxFE10010120	2.3	-.69	.79	.00
	HxFE2003030	2.2	-.73	.91	-.54
Std. Error of Skewness	Air10010120	.7			
	Air2003030	.7			
	Arg1001030	.7			
	Arg20030120	.7			
	Oxy10030120	.7			
	Oxy2001030	.7			
	HxFE10010120	.7			
	HxFE2003030	.7			
Kurtosis	Air10010120	-.9	.89	2.74	-2.35
	Air2003030	-2.2	.95	1.76	-2.49
	Arg1001030	8.8	-4.14	4.40	-2.48
	Arg20030120	1.6	-.94	2.15	-2.00
	Oxy10030120	-.4	.68	2.27	-2.39
	Oxy2001030	-.9	.69	2.21	-2.39
	HxFE10010120	5.6	-2.96	3.35	-1.87
	HxFE2003030	5.2	-3.07	3.44	-2.26
Std. Error of Kurtosis	Air10010120	1.4			
	Air2003030	1.4			
	Arg1001030	1.4			
	Arg20030120	1.4			
	Oxy10030120	1.4			
	Oxy2001030	1.4			
	HxFE10010120	1.4			
	HxFE2003030	1.4			
Minimum	Air10010120	728			
	Air2003030	211			
	Arg1001030	3320			
	Arg20030120	3660			
	Oxy10030120	913			
	Oxy2001030	780			
	HxFE10010120	175			
	HxFE2003030	3030			
Maximum	Air10010120	6350			
	Air2003030	8990			
	Arg1001030	452000			
	Arg20030120	12100			
	Oxy10030120	2985			

		Oxy2001030	6510			
		HxFE10010120	2100			
		HxFE2003030	53000			
Percentiles	25	Air10010120	1263	37.08	353.55	728.00
		Air2003030	358	770.97	1499.96	211.00
		Arg1001030	3920	327.38	1533.13	3320.00
		Arg20030120	4315	172.36	626.63	3660.00
		Oxy10030120	1035	40.30	136.38	913.00
		Oxy2001030	1030	89.05	385.35	780.00
		HxFE10010120	227	17.69	50.31	175.00
		HxFE2003030	4243	537.94	1947.13	3030.00
	50	Air10010120	1925	206.57	1018.09	1165.00
		Air2003030	6150	-1452.91	2678.03	300.00
		Arg1001030	5868	3377.78	21114.08	3470.00
		Arg20030120	5500	293.67	978.15	3980.00
		Oxy10030120	1340	89.92	373.34	1030.00
		Oxy2001030	1450	677.63	1206.67	868.64
		HxFE10010120	345	31.18	129.09	225.00
		HxFE2003030	7100	2690.65	5093.48	3314.67
	75	Air10010120	4900	-564.57	1347.58	1787.50
		Air2003030	7850	-229.58	1118.27	4420.00
		Arg1001030	29050	59417.35	123789.46	5868.00
		Arg20030120	8033	147.25	1776.75	5500.00
		Oxy10030120	2345	-111.70	508.62	1260.00
		Oxy2001030	4795	-305.47	1319.76	1400.00
		HxFE10010120	717	177.41	497.88	345.00
		HxFE2003030	18800	3093.16	11186.45	6760.00

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

Supplementary information 20: Mood's median test results for MC wool

DF	Chi-Square	P-Value
3	4.00	0.261

H_{W10}: Plasma gas type used has no effect on the electrical resistance of MC wool.

Supplementary information 21: Mood's median test descriptive statistics for MC wool

Gas	Median	N <= Overall Median	N > Overall Median	Q3 – Q1	95% Median CI
Air	4037.5	1	1	*	(1925, 6150)
Argon	5684.0	0	2	*	(5500, 5868)
HxFE	3722.5	1	1	*	(345, 7100)
Oxygen	1395.0	2	0	*	(1340, 1450)
Overall	3712.5				

When examining the effect of individual plasma parameters on the electrical resistance of MC wool, a Friedman test was conducted, which revealed a statistically significant difference across the plasma parameters tested in MC wool, X2(2) = 40.667, p = <.001.

H_{W20}: Specific plasma gas treatment type parameters have no effect on the electrical resistance of MXene coated wool.

Supplementary information 22 Friedman test statistics for MC wool.

Test Statistics

N	9
Chi-Square	40.667
df	7
Asymp. Sig.	<.001

a. Friedman Test

Supplementary information 23: Friedman test ranks for MC wool

Ranks

	Mean Rank
Air10010120	4.00
Air2003030	4.44
Arg1001030	6.67
Arg20030120	6.11
Oxy10030120	2.67
Oxy2001030	3.33
HxFE10010120	1.67
HxFE2003030	7.11

To pinpoint how the plasma treatment parameters for each gas type affect the electric resistance of the samples, a post hoc analysis with Wilcoxon signed-rank tests was conducted). A Bonferroni correction was applied, and the resulting significance level was set at $p < 0.0125$. This reveals that the electric resistance of hexafluoroethane-treated MC wool is affected by plasma parameters to a statistically significant degree, $p = .008$. The parameters of air, argon and oxygen plasma treatment revealed no statistically significant effects. Unlike argon and air, oxygen's p-value of .051 warrants further investigation. There may be an effect that further studies could unveil.

$H_{W|3\text{-}6|0}$: The plasma treatment parameters have no effect on the electrical resistance of [GAS] treated MC wool.

Supplementary information 24 Wilcoxon signed rank test results for MC wool.

	Air2003030 - Air10010120	Arg20030120 - Arg1001030	Oxy2001030 - Oxy10030120	HxFE2003030 - HxFE10010120
Z	-1.481b	-.889c	-1.955b	-2.666b
Asymp. Sig. (2-tailed)	.139	.374	.051	.008

a. Wilcoxon Signed Ranks Test b. Based on negative ranks. c. Based on positive ranks.

Supplementary information 25: Wilcoxon Signed Rank test optimal plasma vs no plasma MC wool

Test Statistics

	NoPlasma - HxFE10010120
Z	-2.666b
Asymp. Sig. (2-tailed)	.008

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

H_{W70}: HxFE plasma gas treatment with parameters (P100, S10, T120) has no effect on the electrical resistance of MC wool.

Supplementary information 26: Descriptive statistics for Wilcoxon signed rank test MC Wool

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum

HxFE10010120	9	582.6667	613.06810	175.00	2100.00
NoPlasma	9	556080244.4444	526425816.82852	44900.00	1000000000.00

Supplementary information 27: Ranks for Wilcoxon signed rank test MC Wool

Ranks

		N	Mean Rank	Sum of Ranks
NoPlasma - HxFE10010120	Negative Ranks	0[a]	.00	.00
	Positive Ranks	9[b]	5.00	45.00
	Ties	0[c]		
	Total	9		

a. NoPlasma < HxFE10010120
b. NoPlasma > HxFE10010120
c. NoPlasma = HxFE10010120

Polyester

Supplementary information 28: Bootstrap specifications for MC polyester.

Bootstrap Specifications

Sampling Method	Simple
Number of Samples	1000
Confidence Interval Level	95.0%
Confidence Interval Type	Percentile

Supplementary information 29: Descriptive statistics and frequencies for MC polyester post Bootstrapping

Bootstrapped Statistics

				Bootstrap[a]			
						95% Confidence Interval	
			Statistic	Bias	Std. Error	Lower	Upper
N	Valid	Air10010120	8	0	0	8	8
		Air2003030	8	0	0	8	8
		Arg1001030	8	0	0	8	8
		Arg20030120	8	0	0	8	8
		Oxy10030120	8	0	0	8	8
		Oxy2001030	8	0	0	8	8
		HxFE10010120	8	0	0	8	8
		HxFE2003030	8	0	0	8	8
	Missing	Air10010120	0	0	0	0	0
		Air2003030	0	0	0	0	0
		Arg1001030	0	0	0	0	0
		Arg20030120	0	0	0	0	0
		Oxy10030120	0	0	0	0	0
		Oxy2001030	0	0	0	0	0
		HxFE10010120	0	0	0	0	0
		HxFE2003030	0	0	0	0	0
Mean		Air10010120	42.00	-.17	6.72	30.00	55.75
		Air2003030	27.13	.03	2.91	21.50	33.13
		Arg1001030	21.88	-.07	2.35	17.63	26.62
		Arg20030120	157.88	.63	41.56	97.13	253.99
		Oxy10030120	66119.00	1918.87	44398.54	422.29	154815.31
		Oxy2001030	858.00	-6.28	289.32	343.07	1437.11

	HxFE10010120	1066.50	12.79	392.14	494.32	1966.09
	HxFE2003030	835.75	12.49	193.38	446.02	1222.09
Median	Air10010120	39.50	-.09	7.43	21.00	57.00
	Air2003030	26.50	.11	4.85	19.00	38.00
	Arg1001030	20.00	.50	2.77	18.00	29.00
	Arg20030120	101.50	15.73	36.60	87.00	200.00
	Oxy10030120	577.50	14069.00	43679.45	308.00	171000.00
	Oxy2001030	517.50	62.26	341.47	182.00	1557.50
	HxFE10010120	681.00	63.99	331.73	342.00	1270.00
	HxFE2003030	823.00	39.68	411.98	301.50	1400.00
Std. Deviation	Air10010120	20.18	-2.30	5.44	7.89	27.03
	Air2003030	8.64	-.71	1.41	4.64	10.24
	Arg1001030	6.98	-.75	1.80	2.24	9.23
	Arg20030120	125.45	-18.83	49.75	25.17	179.49
	Oxy10030120	131090.97	-18298.29	51671.22	147.12	183458.46
	Oxy2001030	895.89	-103.78	254.14	191.70	1136.30
	HxFE10010120	1163.72	-182.02	486.37	214.70	1683.59
	HxFE2003030	577.94	-44.17	68.52	360.08	621.22
Skewness	Air10010120	1.08	-.45	.82	-1.02	2.10
	Air2003030	.28	-.04	.76	-1.20	1.82
	Arg1001030	1.00	-.25	.86	-1.14	2.43
	Arg20030120	2.26	-.71	.85	-.19	2.80
	Oxy10030120	1.99	-.40	.91	-.20	2.83
	Oxy2001030	1.34	-.17	.87	-.50	2.64
	HxFE10010120	2.37	-.93	.95	-.48	2.72
	HxFE2003030	.02	-.06	1.04	-2.53	2.63
Std. Error of Skewness	Air10010120	.75				
	Air2003030	.75				
	Arg1001030	.75				
	Arg20030120	.75				
	Oxy10030120	.75				
	Oxy2001030	.75				
	HxFE10010120	.75				
	HxFE2003030	.75				
Kurtosis	Air10010120	1.39	-.86	2.07	-2.21	5.39
	Air2003030	-1.62	.87	1.64	-2.42	4.44
	Arg1001030	.74	-.01	2.36	-2.22	6.43
	Arg20030120	5.35	-3.09	3.45	-2.34	7.88
	Oxy10030120	3.46	-1.18	3.76	-2.34	8.00
	Oxy2001030	.36	.46	3.25	-2.52	7.16
	HxFE10010120	6.01	-3.84	3.57	-2.38	7.53
	HxFE2003030	-2.60	1.49	2.51	-2.72	7.25
Std. Error of Kurtosis	Air10010120	1.48				
	Air2003030	1.48				
	Arg1001030	1.48				
	Arg20030120	1.48				
	Oxy10030120	1.48				
	Oxy2001030	1.48				
	HxFE10010120	1.48				
	HxFE2003030	1.48				
Minimum	Air10010120	20.00				
	Air2003030	17.00				
	Arg1001030	13.00				
	Arg20030120	74.00				

	Oxy10030120	295.00				
	Oxy2001030	156.00				
	HxFE10010120	306.00				
	HxFE2003030	217.00				
Maximum	Air10010120	82.00				
	Air2003030	39.00				
	Arg1001030	35.00				
	Arg20030120	450.00				
	Oxy10030120	355000.00				
	Oxy2001030	2520.00				
	HxFE10010120	3820.00				
	HxFE2003030	1500.00				

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

Supplementary information 30: Response table for means of MC polyester based on median electrical resistance measurements

Level	Gas	Power (W)	SCCM	Time
1	32.00	362.25	440.50	311.50
2	63.00	457.00	378.75	507.75
3	1011.00			
4	532.50			
Delta	979.00	94.75	61.75	196.25
Rank	1	3	4	2

Supplementary information 31: Taguchi Signal to Noise ratios for MC polyester

Level	Gas	Power (W)	SCCM	Time
1	*	*	*	*
2	*	*	*	*
3	*			
4	*			
Delta	*	*	*	*
Rank	2.5	2.5	2.5	2.5

Nominal is best (10×Log10(Ybar^2/s^2))

Supplementary information 32 Mood's median test results for MC polyester.

DF	Chi-Square	P-Value
3	8.00	0.046

H_{P10}: Plasma gas type used has no effect on the electrical resistance of MC polyester.

Supplementary information 33: Mood's median descriptive statistics for MC polyester

Gas	Median	N <= Overall Median	N > Overall Median	Q3 – Q1	95% Median CI

Air	33.00	2	0	*	(26.5, 39.5)
Argon	60.75	2	0	*	(20, 101.5)
HxFE	752.00	0	2	*	(681, 823)
Oxygen	547.50	0	2	*	(517.5, 577.5)
Overall	309.50				

Supplementary information 34: Friedman test statistics for MC polyester.

Friedman Test Statistics

N	8
Chi-Square	47.665
df	7
Asymp. Sig.	<.001

Supplementary information 35: Friedman test ranks for MC polyester

Friedman Test Ranks

	Mean Rank
Air10010120	2.94
Air2003030	1.81
Arg1001030	1.25
Arg20030120	4.25
Oxy10030120	6.88
Oxy2001030	6.00
HxFE10010120	6.38
HxFE2003030	6.50

Supplementary information 36: Wilcoxon Signed Rank test statistics for MC polyester.

	Air2003030 - Air10010120	Arg20030120 - Arg1001030	Oxy2001030 - Oxy10030120	HxFE2003030 - HxFE10010120
Z	-2.524b	-2.666c	-.840b	-.770c
Asymp. Sig. (2-tailed)	.012	.008	.401	.441

a. Wilcoxon Signed Ranks Test b. Based on positive ranks. c. Based on negative ranks.

Supplementary information 37: Wilcoxon Signed Rank test ranks for MC polyester coupled by gas type

Ranks

		N	Mean Rank	Sum of Ranks
Air2003030 - Air10010120	Negative Ranks	8[a]	4.50	36.00
	Positive Ranks	0[b]	.00	.00
	Ties	1[c]		
	Total	9		
Arg20030120 - Arg1001030	Negative Ranks	0[d]	.00	.00
	Positive Ranks	9[e]	5.00	45.00
	Ties	0[f]		
	Total	9		
Oxy2001030 - Oxy10030120	Negative Ranks	5[g]	4.80	24.00
	Positive Ranks	3[h]	4.00	12.00
	Ties	0[i]		
	Total	8		

HxFE2003030 - HxFE10010120	Negative Ranks	3[j]	5.33	16.00
	Positive Ranks	6[k]	4.83	29.00
	Ties	0[l]		
	Total	9		

a. Air2003030 < Air10010120, b. Air2003030 > Air10010120, c. Air2003030 = Air10010120, d. Arg20030120 < Arg1001030, e. Arg20030120 > Arg1001030, f. Arg20030120 = Arg1001030, g. Oxy2001030 < Oxy10030120, h. Oxy2001030 > Oxy10030120, i. Oxy2001030 = Oxy10030120, j. HxFE2003030 < HxFE10010120, k. HxFE2003030 > HxFE10010120, l. HxFE2003030 = HxFE10010120

Supplementary information 38: Wilcoxon Signed Rank test polyester treatment vs no treatment

	NoPlasma - Arg1001030
Z	-2.666b
Asymp. Sig. (2-tailed)	.008

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

Supplementary information 39: Wilcoxon Signed Rank test statistics Polyester

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Arg1001030	9	23.4444	8.04846	13.00	36.00
NoPlasma	9	2574.1111	1939.18330	450.00	5180.00

Supplementary information 40: Wilcoxon Signed Rank test Polyester

Ranks

		N	Mean Rank	Sum of Ranks
NoPlasma - Arg1001030	Negative Ranks	0a	.00	.00
	Positive Ranks	9b	5.00	45.00
	Ties	0c		
	Total	9		

a. NoPlasma < Arg1001030

b. NoPlasma > Arg1001030

c. NoPlasma = Arg1001030

Linen

Supplementary information 41: Bootstrap specifications for MC linen

Bootstrap Specifications

Sampling Method	Simple
Number of Samples	1000
Confidence Interval Level	95.0%
Confidence Interval Type	Percentile

Supplementary information 42: Descriptive statistics and frequencies of MC linen by Taguchi parameter post Bootstrapping

Statistics

				Bootstrap[a]			
						95% Confidence Interval	
			Statistic	Bias	Std. Error	Lower	Upper
N	Valid	Air10010120	9	0	0	9	9
		Air2003030	9	0	0	9	9
		Arg1001030	9	0	0	9	9
		Arg20030120	9	0	0	9	9
		Oxy10030120	9	0	0	9	9
		Oxy2001030	9	0	0	9	9
		HxFE10010120	9	0	0	9	9
		HxFE2003030	9	0	0	9	9
	Missing	Air10010120	0	0	0	0	0
		Air2003030	0	0	0	0	0
		Arg1001030	0	0	0	0	0
		Arg20030120	0	0	0	0	0
		Oxy10030120	0	0	0	0	0
		Oxy2001030	0	0	0	0	0
		HxFE10010120	0	0	0	0	0
		HxFE2003030	0	0	0	0	0
Mean		Air10010120	763.89	2.72	209.40	410.38	1228.17
		Air2003030	386.11	2.19	61.87	275.23	519.95
		Arg1001030	272.56	.48	41.56	189.78	354.97
		Arg20030120	127.89	.11	19.16	89.58	165.00
		Oxy10030120	3006.44	15.36	668.36	1835.36	4443.16
		Oxy2001030	23028.89	238.23	9090.93	8517.31	42554.07
		HxFE10010120	3516.00	17.70	1087.81	1776.74	5842.86
		HxFE2003030	8706.67	-51.17	3797.23	2975.81	17281.11
Median		Air10010120	442.00	75.95	229.48	368.00	1280.00
		Air2003030	359.00	11.06	82.91	176.13	685.00
		Arg1001030	277.00	-11.80	78.95	136.00	420.00
		Arg20030120	131.00	-6.95	28.16	65.00	200.00
		Oxy10030120	2730.00	-165.15	863.14	1100.00	4970.00
		Oxy2001030	8900.00	5493.38	10803.60	2490.00	37000.00
		HxFE10010120	1925.00	490.18	1410.52	1045.00	5700.00
		HxFE2003030	3020.00	1021.69	2522.02	2500.00	11250.00
Std. Deviation		Air10010120	655.93	-74.70	220.06	64.26	922.11
		Air2003030	198.52	-13.66	37.35	98.28	245.35
		Arg1001030	131.39	-9.48	19.17	73.69	152.31
		Arg20030120	59.45	-4.77	10.23	33.06	72.07
		Oxy10030120	2116.23	-167.10	530.55	897.19	2887.91

	Oxy2001030	28109.18	-3132.76	9427.51	7449.78	40213.47
	HxFE10010120	3401.84	-341.82	1044.04	1295.77	4713.40
	HxFE2003030	12744.91	-2153.43	5601.23	593.15	18926.27
Skewness	Air10010120	1.88	-.37	.83	-.27	2.95
	Air2003030	.53	-.09	.64	-1.08	1.67
	Arg1001030	.21	-.01	.70	-1.14	1.55
	Arg20030120	.21	-.02	.60	-1.00	1.39
	Oxy10030120	1.23	-.33	.68	-.40	2.28
	Oxy2001030	1.90	-.51	.76	-.24	2.81
	HxFE10010120	1.70	-.33	.80	-.33	2.89
	HxFE2003030	2.67	-.77	.96	-.24	2.99
Std. Error of Skewness	Air10010120	.72				
	Air2003030	.72				
	Arg1001030	.72				
	Arg20030120	.72				
	Oxy10030120	.72				
	Oxy2001030	.72				
	HxFE10010120	.72				
	HxFE2003030	.72				
Kurtosis	Air10010120	3.36	-1.25	3.22	-2.18	8.79
	Air2003030	-.58	.38	1.61	-2.22	3.71
	Arg1001030	-1.72	.77	1.35	-2.37	2.78
	Arg20030120	-.97	.44	1.23	-2.03	3.09
	Oxy10030120	1.29	-.80	2.09	-2.05	5.66
	Oxy2001030	3.82	-2.10	2.97	-2.41	8.10
	HxFE10010120	2.73	-1.10	3.03	-2.44	8.52
	HxFE2003030	7.39	-3.65	4.10	-2.31	8.96
Std. Error of Kurtosis	Air10010120	1.40				
	Air2003030	1.40				
	Arg1001030	1.40				
	Arg20030120	1.40				
	Oxy10030120	1.40				
	Oxy2001030	1.40				
	HxFE10010120	1.40				
	HxFE2003030	1.400				
Minimum	Air10010120	298.00				
	Air2003030	128.00				
	Arg1001030	118.00				
	Arg20030120	43.00				
	Oxy10030120	870.00				
	Oxy2001030	2450.00				
	HxFE10010120	757.00				
	HxFE2003030	1910.00				
Maximum	Air10010120	2280.00				
	Air2003030	689.00				
	Arg1001030	458.00				
	Arg20030120	219.00				
	Oxy10030120	7430.00				
	Oxy2001030	89000.00				
	HxFE10010120	11200.00				
	HxFE2003030	41600.00				

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

Supplementary information 43: Response table for means of MC linen based on median electrical resistance

Level	Gas	Power (W)	SCC M	Time
1	400.5	1343.5	3159.8	2865.3
2	204.0	3102.5	1286.3	1580.8
3	2472.5			
4	5815.0			
Delta	5611.0	1759.0	1873.5	1284.5
Rank	1	3	2	4

Nominal is best (10×Log10(Ybar^2/s^2))

Supplementary information 44: Response table for signal to noise ratios of MC linen based on median electrical resistance

Level	Gas	Power (W)	SCC M	Time
1	*	*	*	*
2	*	*	*	*
3	*			
4	*			
Delta	*	*	*	*
Rank	2.5	2.5	2.5	2.5

Supplementary information 45: Mood's Median test results for MC linen.

DF	Chi-Square	P-Value
3	8.00	0.046

H_{L10}: Plasma gas type used has no effect on the electrical resistance of MC linen.

Supplementary information 46: Mood's Median descriptive statistics for MC linen by gas type

Gas	Median	N <= Overall Median	N > Overall Median	Q3 – Q1	95% Median CI
Air	982.5	2	0	*	(685, 1280)
Argon	310.0	2	0	*	(200, 420)
HxFE	8475.0	0	2	*	(5700, 11250)
Oxygen	20985.0	0	2	*	(4970, 37000)
Overall	3125.0				

Supplementary information 47: Friedman test ranks for MC linen

Ranks

	Mean Rank
Air10010120	4.00
Air2003030	3.00

Arg1001030	2.00
Arg20030120	1.33
Oxy10030120	5.67
Oxy2001030	7.67
HxFE10010120	5.89
HxFE2003030	6.44

Supplementary information 48: Friedman test results for MC linen.

N	9
Chi-Square	53.815
df	7
Asymp. Sig.	<.001

Supplementary information 49: Wilcoxon Signed Rank test statistics for MC linen coupled by gas type.

	Air2003030 - Air10010120	Arg20030120 - Arg1001030	Oxy2001030 - Oxy10030120	HxFE2003030 - HxFE10010120
Z	-1.599b	-2.073b	-2.666c	-.770c
Asymp. Sig. (2-tailed)	.110	.038	.008	.441

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

c. Based on negative ranks.

HL[3-6]0: The plasma treatment parameters have no effect on the electrical resistance of [GAS] treated MC linen.

Supplementary information 50: Wilcoxon Signed Ranks for MC linen coupled by gas type

Ranks

		N	Mean Rank	Sum of Ranks
Air2003030 - Air10010120	Negative Ranks	6[a]	6.00	36.00
	Positive Ranks	3[b]	3.00	9.00
	Ties	0[c]		
	Total	9		
Arg20030120 - Arg1001030	Negative Ranks	7[d]	5.71	40.00
	Positive Ranks	2[e]	2.50	5.00
	Ties	0[f]		
	Total	9		
Oxy2001030 - Oxy10030120	Negative Ranks	0[g]	.00	.00
	Positive Ranks	9[h]	5.00	45.00
	Ties	0[i]		
	Total	9		
HxFE2003030 - HxFE10010120	Negative Ranks	3[j]	5.33	16.00
	Positive Ranks	6[k]	4.83	29.00
	Ties	0[l]		
	Total	9		

a. Air2003030 < Air10010120, b. Air2003030 > Air10010120, c. Air2003030 = Air10010120, d. Arg20030120 < Arg1001030, e. Arg20030120 > Arg1001030, f. Arg20030120 = Arg1001030, g. Oxy2001030 < Oxy10030120, h. Oxy2001030 > Oxy10030120, i. Oxy2001030 = Oxy10030120, j. HxFE2003030 < HxFE10010120, k. HxFE2003030 > HxFE10010120, l. HxFE2003030 = HxFE10010120

Supplementary information 51: Wilcoxon Signed Rank Test of Arg20030120 vs. non-plasma treated MC linen.

	NoPlasma - Arg20030120
Z	-2.666b
Asymp. Sig. (2-tailed)	.008

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

H_{L70}: Argon plasma gas treatment with parameters (P200, S30, T120) has no effect on the electrical resistance of MC linen.

Supplementary information 52: Wilcoxon Signed Rank test of Arg20030120 vs non-plasma treated MC linen descriptive statistics

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Arg20030120	9	127.8889	59.44839	43.00	219.00
NoPlasma	9	109352.2222	281865.21459	1420.00	860000.00

Supplementary information 53: Wilcoxon Signed Rank test of Arg20030120 vs non-plasma treated MC linen ranks

Ranks

		N	Mean Rank	Sum of Ranks
NoPlasma - Arg20030120	Negative Ranks	0[a]	.00	.00
	Positive Ranks	9[b]	5.00	45.00
	Ties	0[c]		
	Total	9		

a. NoPlasma < Arg20030120
b. NoPlasma > Arg20030120
c. NoPlasma = Arg20030120

Supplementary information 54 Hypotheses under test

Hypothesis	Statistical test	Significance values (p-value)	Accept / reject
H_{1Null}: Plasma gas type used has no effect on the electrical resistance of MXene coated nylon.	Mood's Median	.046	**Null rejected**
H_{N2Null}: Specific plasma gas treatment type parameters have no effect on the electrical resistance of MXene coated nylon.	Friedman	<.001	**Null rejected**
H_{N3Null}: The plasma treatment parameters have no effect the electrical resistance of air treated MC nylon.	Wilcoxon Signed Rank Test (Bonferroni correction applied, significance level set at p < .0125)	.953	**Null retained**
H_{N4Null}: The plasma treatment parameters have no effect the electrical resistance of argon treated MC nylon.		.038	**Null retained**
H_{N5Null}: The plasma treatment parameters have no effect the electrical resistance of air treated MC nylon.		.110	**Null retained**
H_{N6Null}: The plasma treatment parameters have no effect the electrical resistance of hexafluoroethane treated MC nylon.		.008	**Null rejected**
H_{N7Null}: Air plasma gas treatment with parameters (P100, S10, T120) has no effect on the electrical resistance of MC nylon.	Wilcoxon Signed Rank Test	.008	**Null rejected**
H_{W1Null}: Plasma gas type used has no effect on the electrical resistance of MC wool.	Mood's Median	.261	**Null retained**
H_{W2Null}: Specific plasma gas treatment type parameters have no effect on the electrical resistance of MXene coated wool.	Friedman	<.001	**Null rejected**
H_{W3Null}: The plasma treatment parameters have no effect on the electrical resistance of air treated MC wool.	Wilcoxon Signed Rank Test (Bonferroni correction applied, significance level set at p < .0125)	.139	**Null retained**
H_{W4Null}: The plasma treatment parameters have no effect on the electrical resistance of argon treated MC wool.		.374	**Null retained**
H_{W5Null}: The plasma treatment parameters have no effect on the electrical resistance of oxygen treated MC wool.		.051	**Null retained**
H_{W6Null}: The plasma treatment parameters have no effect on the electrical resistance of HxFE treated MC wool.		.008	**Null rejected**
H_{W7Null}: HxFE plasma gas treatment with parameters (P100, S10, T120) has no effect on the electrical resistance of MC wool.	Wilcoxon Signed Rank Test	.008	**Null rejected**
H_{P1Null}: Plasma gas type used has no effect on the electrical resistance of MC polyester.	Mood's Median	.046	**Null rejected**
H_{P2Null}: Specific plasma gas treatment type parameters have no effect on the electrical resistance of MC polyester.	Friedman test	<.001	**Null rejected**
H_{P3Null}: The plasma treatment parameters have no effect on the electrical resistance of air treated MC polyester.	Wilcoxon Signed Rank Test (Bonferroni correction applied,	.012	**Null rejected**
H_{P4Null}: The plasma treatment parameters have no effect on the electrical resistance of argon treated MC polyester.		.008	**Null rejected**
H_{P5Null}: The plasma treatment parameters have no effect on the electrical resistance of oxygen		.401	**Null retained**

treated MC polyester.	set at p < .0125)		
$\mathbf{H_{P6Null}}$: The plasma treatment parameters have no effect on the electrical resistance of HxFE treated MC polyester.		.441	**Null retained**
$\mathbf{H_{P7Null}}$: Argon plasma gas treatment with parameters (P100, S10, T30) has no effect on the electrical resistance of MC polyester.	Wilcoxon Signed Rank Test	.008	**Null rejected**
$\mathbf{H_{L1Null}}$: Plasma gas type used has no effect on the electrical resistance of MC linen.	Mood's Median	.046	**Null rejected**
$\mathbf{H_{L2Null}}$: Specific plasma gas treatment type parameters have no effect on the electrical resistance of MC linen.	Friedman test	<.001	**Null rejected**
$\mathbf{H_{L3Null}}$: The plasma treatment parameters have no effect on the electrical resistance of air treated MC linen.	Wilcoxon Signed Rank Test (Bonferroni correction applied, significance level set at p < .0125)	.110	**Null retained**
$\mathbf{H_{L4Null}}$: The plasma treatment parameters have no effect on the electrical resistance of argon treated MC linen.		.038	**Null retained**
$\mathbf{H_{L5Null}}$: The plasma treatment parameters have no effect on the electrical resistance of oxygen treated MC linen.		.008	**Null rejected**
$\mathbf{H_{L6Null}}$: The plasma treatment parameters have no effect on the electrical resistance of oxygen treated MC linen.		.441	**Null retained**
$\mathbf{H_{L7Null}}$: Argon plasma gas treatment with parameters (P200, S30, T120) has no effect on the electrical resistance of MC linen.	Wilcoxon Signed Rank Test	.008	**Null rejected**