Electronic Supporting Information

A summary of key reactive oxygen and nitrogen reactions induced by plasma interactions with water.

Number	Reaction	Ref
(1)	$H_2O + e^- \rightarrow \bullet OH + H + e^-$	3, 30
(2)	$H_2O + e^- \rightarrow H^+ + \bullet OH + 2e^-$	3, 30
(3)	$H_2O + e^- \rightarrow 2H\bullet + O\bullet + e^-$	3, 30
(4)	$O_2 + e^- \rightarrow O^+ + O\bullet + 2e^-$	3, 30
(5)	$O_2 + e^- \rightarrow O^- + O\bullet$	3, 30
(6)	$O\bullet + O_2 \rightarrow O_3$	3, 30
(7)	$O_3 + NO \rightarrow NO_2 + O_2$	3, 30
(8)	$N\bullet + O_2 \rightarrow NO + O\bullet$	3, 30
(9)	$O\bullet + N_2 \rightarrow NO + N\bullet$	3, 30
(10)	$O\bullet + NO_2 \rightarrow NO + O_2$	3, 30
(11)	$2NO + O_2 \rightarrow 2NO_2$	3, 30
(12)	$NO_2 + \bullet OH \rightarrow HNO_3$	3, 30
(13)	$H_2O_2 + h\nu \rightarrow \bullet OH + \bullet OH$	3, 30
(14)	$3NO_2 + H_2O \rightarrow 2HNO_3 + NO$	3, 30
(15)	$H_2O_2 + H^+ + NO_2^- \rightarrow ONOOH + H_2O$	3, 30
(16)	$OH + OH \rightarrow H_2O_2$	3, 30
(17)	$NO + NO \rightarrow N_2 + O_2$	3, 30
(18)	$NO + \bullet OH \rightarrow HNO_2$	3, 30
(19)	$HNO_2 + \bullet OH \rightarrow NO_2 + H_2O$	3, 30
(20)	$NO_2 + h\nu \rightarrow NO + O\bullet$	3, 30
(21)	$NO_3 + h\nu \rightarrow NO + O_2$	3, 30
(22)	$NO_2 + NO_3 \rightarrow N_2H_5$	3, 30
(23)	$N_2O_5 + H_2O \rightarrow 2HNO_3$	3, 30
(24)	$2NO_2 + H_2O \rightarrow NO_2^- + NO_3^- + 2H^+$	3, 30
(25)	$3NO_2^- + 3H^+ \rightarrow 2NO + NO_3^- + H_3O^+$	3, 30
(26)	$OH + NO_2 \rightarrow [O = N - OOH] \rightarrow [O = N - OO^- + H^+]$	3, 30
(27)	$O_2 + O_2 + O\bullet \rightarrow O_3 + O_2$	26
(28)	$N_2 + O_2 \rightarrow 2NO$	26
(29)	$N\bullet + O\bullet \rightarrow NO$	17
(30)	$NO + O\bullet \rightarrow NO_2$	17
(31)	$NO_2 + O_3 \leftrightarrow NO_3 + O_2$	17
(32)	$NO + NO_3 \leftrightarrow NO_2 + NO_2$	17
(33)	$NO + NO_2 + H_2O \rightarrow 2NO_2^- + 2H^+$	17
(34)	$NO_2^- + O_3 \rightarrow NO_3^- + O_2$	17
(35)	$NO + \bullet O_2^- \leftrightarrow NO_3^-$	17
(36)	$ONOOH \rightarrow NO_2 + \bullet OH$	31
(37)	$ONOOH \rightarrow HNO_3 \rightarrow NO_3^- + H^+$	31

(38) $NO_3 + HO_2 \rightarrow NO_3^- + O_2 + H^+$ [27]

(39) $\bullet NO_2 + \bullet OH + M \rightarrow ONOOH + M$ [27]

(40) $\bullet NO + HO_2\bullet \rightarrow ONOOH$ [27]

(41) $\bullet NO + \bullet O_2^- \rightarrow ONOO^-$ [27]

(42) $ONOOH + H_2O_2 \rightarrow O_2NOOH + H_2O$ [27]

(43) $O_2NOOH \rightarrow NO_2 + HO_2\bullet (Only\ at\ acidic\ pH)$ [27]

Full pH data sets

AC Tap pH					
Time (min)	He	CO_2	Ar	Air	N_2
0	8.16	8.16	8.16	8.16	8.16
1	9.09	5.21	9.13	9.06	9.15
5	8.78	5.08	9.09	8.32	8.98
10	8.75	5.04	9.06	8.12	8.86
15	8.31	4.98	8.61	7.22	8.98
DC Tap pH					
Time (min)	He	CO_2	Ar	Air	N_2
0	8.16	8.16	8.16	8.16	8.16
1	9.12	5.26	8.12	7.22	7.87
5	8.70	5.30	7.22	4.34	7.29
10	8.66	5.86	9.09	3.78	6.27
15	8.69	6.46	8.78	3.66	4.41
DC DI pH					
Time (min)	He	CO_2	Ar	Air	N_2
0	5.26	5.26	5.26	5.26	5.26
1	5.57	4.25	5.82	3.61	3.99
5	5.72	5.08	5.59	3.21	3.52
10	5.34	4.75	5.29	2.99	3.31
15	4.94	5.28	5.01	2.88	3.38
110 ns Pulsed DI pH					
Time (min)	He	CO_2	Ar	Air	N_2
0	5.26	5.26	5.26	5.26	5.26
1	5.73	4.17	5.62	5.02	4.72
5	4.88	3.94	4.55	4.46	4.79
10	4.37	3.94	4.30	3.98	4.48
15	5.49	4.05	5.02	3.52	3.81
220 ns Pulsed DI pH					

Time (min)	He	CO_2	Ar	Air	N_2
0	5.26	5.26	5.26	5.26	5.26
1	5.72	4.19	5.59	4.22	4.71
5	4.67	3.96	4.39	4.42	4.74
10	4.32	3.94	4.17	3.88	4.35
15	5.69	4.07	5.63	3.46	3.73
400 ns Pulsed DI pH					
Time (min)	He	CO_2	Ar	Air	N_2
0	5.26	5.26	5.26	5.26	5.26
1	5.39	4.08	5.24	4.98	4.78
5	4.73	3.94	4.30	4.22	4.50
10	4.35	3.98	4.25	3.98	4.24
15	5.15	3.84	5.47	3.34	3.71

Full Platinum Conductivity Data Sets

AC DI Conductivity ($\mu S \cdot cm^{-1}$)					
Time (min)	He	CO_2	Ar	Air	N_2
0	0.76	0.76	0.76	0.76	0.76
1	1.01	32.3	0.950	3.22	1.02
5	0.690	44.3	1.07	16.1	0.720
10	0.680	44.7	1.29	24.7	0.920
15	12.9	53.6	3.78	38.2	0.740
AC Tap Conductivity ($\mu S \cdot cm^{-1}$)					
Time (min)	He	CO_2	Ar	Air	N_2
0	778	778	778	778	778
1	700	718	747	698	695
5	746	722	779	703	696
10	717	727	778	705	704
15	727	772	769	712	699
DC Tap Conductivity ($\mu S \cdot cm^{-1}$)					
Time (min)	He	CO_2	Ar	Air	N_2
0	778	778	778	778	778
1	721	730	705	747	760
5	734	752	712	813	789
10	781	784	700	892	827
15	802	830	746	928	898

DC DI Conductivity ($\mu S \cdot cm^{-1}$)					
Time (min)	He	CO_2	Ar	Air	N_2
0	0.76	0.76	0.76	0.76	0.76
1	1.20	30.4	1.05	150	50.3
5	1.30	13.7	2.68	367	194
10	15.5	27.1	27.2	493	262
15	76.8	25.8	28.0	673	306
110 ns Pulsed DI Conductivity ($\mu S \cdot cm^{-1}$)					
Time (min)	He	CO_2	Ar	Air	N_2
0	0.76	0.76	0.76	0.76	0.76
1	0.75	25.8	0.78	6.80	7.07
5	55.5	46.9	12.4	39.7	10.4
10	19.5	47.6	22.0	52.4	12.8
15	1.49	39.4	4.45	176	95.7
220 ns Pulsed DI Conductivity ($\mu S \cdot cm^{-1}$)					
Time (min)	He	CO_2	Ar	Air	N_2
0	0.76	0.76	0.76	0.76	0.76
1	0.65	27.1	37.5	2.48	6.81
5	9.70	45.9	17.0	23.6	10.7
10	22.6	46.6	28.0	42.8	18.9
15	1.37	38.9	1.05	141	163
400 ns Pulsed DI Conductivity ($\mu S \cdot cm^{-1}$)					
Time (min)	He	CO_2	Ar	Air	N_2
0	0.76	0.76	0.76	0.76	0.76
1	45.6	33.0	26.1	5.53	62.4
5	8.25	46.2	19.8	26.3	20.9
10	19.1	44.5	27.2	47.1	24.6
15	40.7	76.6	156	237	168