Supplementary Materials

Characterization of Lithium-Ion Battery Fire Emissions—Part 2: Particle Size Distributions and Emission Factors

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Table S1. EFs for four size fractions in particles/Wh and mg/Wh for particle number and mass, respectively.

Cell Type	Cell SOC	Particle Number (particle/Wh)				Particle Mass (mg/Wh)			
		$PM_{0.1}$	PM_1	$PM_{2.5}$	PM_{10}	$PM_{0.1}$	PM_1	$PM_{2.5}$	PM_{10}
LFP	0%	(3.6 ± 1.1)e+13	(4.3 ± 1.4)e+13	(4.3 ± 1.4)e+13	(4.3 ± 1.4)e+13	10.9 ± 1.0	134.7 ± 16.2	140.1 ± 16.7	141.7 ± 16.7
	30%	(3.3 ± 0.58)e+13	(4.0 ± 0.68)e+13	(4.0 ± 0.68)e+13	(4.0 ± 0.68)e+13	8.5 ± 1.1	110.6 ± 17.0	115.8 ± 17.9	117.8 ± 18.1
	50%	(1.5 ± 0.18)e+13	(2.4 ± 0.29)e+13	(2.4 ± 0.29)e+13	(2.4 ± 0.29)e+13	4.9 ± 0.3	67.4 ± 4.4	67.4 ± 4.4	75.5 ± 5.2
	75%	(1.5 ± 0.28)e+13	(2.7 ± 0.31)e+13	(2.7 ± 0.31)e+13	(2.7 ± 0.31)e+13	4.4 ± 0.3	87.2 ± 10.1	87.3 ± 10.1	100.3 ± 13.0
	100%	(1.6 ± 0.16)e+13	(2.3 ± 0.33)e+13	(2.3 ± 0.33)e+13	(2.3 ± 0.33)e+13	6.4 ± 2.1	85.2 ± 30.5	88.2 ± 32.1	101.8 ± 35.3
LCO	0%	(9.6 ± 0.49)e+12	(1.4 ± 0.05)e+13	(1.4 ± 0.05)e+13	(1.4 ± 0.05)e+13	2.3 ± 0.2	36.8 ± 2.9	37.0 ± 2.9	39.0 ± 3.2
	30%	(5.4 ± 0.67)e+12	(9.6 ± 1.4)e+12	(9.6 ± 1.4)e+12	(9.6 ± 1.4)e+12	1.6 ± 0.3	35.4 ± 2.4	35.5 ± 2.4	38.6 ± 2.1
	60%	(4.0 ± 0.54)e+12	(9.6 ± 1.9)e+12	(9.6 ± 1.9)e+12	(9.6 ± 1.9)e+12	1.2 ± 0.1	44.8 ± 3.6	45.1 ± 3.6	55.0 ± 2.9
	80%	(3.2 ± 0.45)e+12	(6.8 ± 0.92)e+12	(6.8 ± 0.92)e+12	(6.8 ± 0.92)e+12	0.6 ± 0.1	44.0 ± 10.0	44.5 ± 10.2	51.9 ± 10.6
	100%	(3.9 ± 0.57)e+12	(8.4 ± 0.70)e+12	(8.4 ± 0.70)e+12	(8.4 ± 0.70)e+12	0.7 ± 0.2	34.7 ± 1.3	35.0 ± 1.4	42.1 ± 1.3

Table S2. EFs in mg/Wh for $PM_{2.5}$ chemical constituents.

Cell Type	Cell SOC	Carbon Fractions		Ion and Element Groups			
		OC	EC	Phosphate	Other Ions	Elements	Unidentified
LFP	0%	106.3 ± 15.8	2.5 ± 1.4	2.2 ± 1.0	3.4 ± 1.1	2.1 ± 0.5	24.5 ± 3.6
	30%	86.2 ± 10.0	0.3 ± 0.1	1.3 ± 0.4	2.2 ± 0.7	2.2 ± 0.3	24.3 ± 7.9
	50%	9.2 ± 0.9	3.0 ± 1.3	29.6 ± 2.0	0.5 ± 0.4	11.8 ± 1.5	23.1 ± 1.3
	75%	5.8 ± 3.0	23.6 ± 2.6	31.4 ± 2.7	1.8 ± 0.1	12.5 ± 1.7	22.6 ± 5.6
	100%	63.0 ± 31.5	4.5 ± 2.4	8.1 ± 3.3	2.1 ± 0.5	4.2 ± 0.9	9.0 ± 2.0
LCO	0%	9.5 ± 3.7	8.4 ± 2.3	8.8 ± 2.9	1.4 ± 0.2	4.1 ± 1.4	7.6 ± 1.7
	30%	7.2 ± 4.0	14.1 ± 1.0	7.0 ± 2.1	1.2 ± 0.4	2.9 ± 0.5	5.4 ± 0.4
	60%	2.8 ± 1.2	15.6 ± 1.3	13.2 ± 0.8	1.0 ± 0.4	6.1 ± 0.3	10.7 ± 1.2
	80%	24.5 ± 11.5	7.1 ± 1.7	3.9 ± 1.7	0.9 ± 0.2	3.2 ± 0.7	6.5 ± 1.7
	100%	15.9 ± 3.9	7.5 ± 0.8	2.8 ± 0.7	1.9 ± 0.2	3.6 ± 0.5	5.0 ± 3.9

Table S3. EFs in mg/Wh for acidic gases for all cell types and SOCs.

Cell Type	Cell SOC	Gaseous Ions			
		HF	HCl	HNO_3	H_2SO_4
LFP	0%	66.02 ± 13.94	1.26 ± 0.27	0.0 ± 0.01	12.4 ± 4.08
	30%	51.98 ± 3.46	0.68 ± 0.09	0.0 ± 0.01	4.78 ± 1.91
	50%	56.4 ± 8.14	0.71 ± 0.35	0.0 ± 0.0	2.69 ± 2.42
	75%	81.35 ± 3.04	1.22 ± 0.38	0.0 ± 0.0	4.68 ± 2.38
	100%	38.88 ± 3.37	0.73 ± 0.34	0.0 ± 0.0	5.8 ± 2.95
LCO	0%	13.67 ± 0.67	0.21 ± 0.03	0.0 ± 0.0	1.5 ± 0.22
	30%	10.24 ± 0.6	0.18 ± 0.04	0.0 ± 0.0	1.95 ± 0.32
	60%	11.36 ± 1.53	0.14 ± 0.07	0.0 ± 0.0	0.61 ± 0.53
	80%	11.69 ± 2.97	0.19 ± 0.07	0.0 ± 1e-3	1.36 ± 0.59
	100%	10.48 ± 1.77	0.14 ± 0.07	0.0 ± 0.0	1.26 ± 0.59

Table S4. EFs in mg/Wh for particulate anions and cations for all cell types and SOCs.

Cell Type	Cell SOC	Anions					Cations					
		F^-	Cl^-	NO_3^-	SO_4^{2-}	PO_4^{3-}	Li^+	Na^+	NH_4^+	K^+	Mg^{2+}	Ca^{2+}
LFP	0%	2.925 ± 1.101	0.142 ± 0.142	0.017 ± 0.005	0.013 ± 0.013	2.217 ± 1.002	7e-4 ± 0.001	0.004 ± 0.005	0.112 ± 0.028	0.0 ± 0.002	0.126 ± 0.05	0.011 ± 0.011
	30%	1.46 ± 0.803	0.387 ± 0.224	0.015 ± 0.012	0.015 ± 0.011	1.282 ± 0.428	5e-4 ± 0.001	5e-4 ± 0.004	0.102 ± 0.028	0.0 ± 0.002	0.168 ± 0.084	0.007 ± 0.007
	50%	0.394 ± 0.394	9e-4 ± 0.005	0.011 ± 0.002	0.002 ± 0.004	29.606 ± 1.969	0.016 ± 0.011	0.004 ± 0.005	0.016 ± 0.006	0.0 ± 0.002	0.014 ± 0.009	0.017 ± 0.017
	75%	1.379 ± 0.056	0.292 ± 0.046	0.039 ± 0.015	0.012 ± 0.004	31.384 ± 2.679	0.005 ± 0.002	0.011 ± 0.01	0.026 ± 0.006	0.0 ± 0.002	0.0 ± 0.003	0.0 ± 0.003
	100%	1.923 ± 0.46	0.005 ± 0.004	0.018 ± 0.006	0.0 ± 0.003	8.135 ± 3.253	0.002 ± 0.001	0.007 ± 0.005	0.081 ± 0.049	0.0 ± 0.002	0.064 ± 0.042	0.023 ± 0.013
LCO	0%	1.039 ± 0.227	0.006 ± 0.004	0.005 ± 0.002	0.128 ± 0.045	8.813 ± 2.896	3e-4 ± 6e-4	0.002 ± 0.002	0.175 ± 0.016	0.0 ± 7e-4	0.007 ± 0.004	0.007 ± 0.007
	30%	0.783 ± 0.301	0.146 ± 0.092	0.014 ± 0.004	0.134 ± 0.053	7.028 ± 2.146	2e-4 ± 6e-4	0.003 ± 0.002	0.132 ± 0.033	0.0 ± 7e-4	0.003 ± 0.002	0.0 ± 0.001
	60%	0.81 ± 0.262	0.091 ± 0.091	0.009 ± 0.005	0.017 ± 0.008	13.191 ± 0.8	0.06 ± 0.029	8e-4 ± 0.002	0.042 ± 0.015	0.0 ± 7e-4	0.007 ± 0.003	0.0 ± 0.001
	80%	0.303 ± 0.203	0.016 ± 0.011	0.014 ± 0.011	0.239 ± 0.086	3.906 ± 1.727	0.233 ± 0.082	0.002 ± 0.002	0.07 ± 0.036	0.0 ± 6e-4	0.006 ± 0.003	0.0 ± 0.001
	100%	0.832 ± 0.082	0.004 ± 0.004	0.004 ± 0.004	0.396 ± 0.036	2.791 ± 0.75	0.594 ± 0.146	0.013 ± 0.004	0.034 ± 0.019	0.0 ± 8e-4	0.011 ± 0.004	0.004 ± 0.004

Table S5. EFs in mg/Wh for elements for all cell types and SOCs.

Cell Type	Cell SOC	Li	Be	Na	Mg	Al	Si	P	S	K	Ca	Sc	Ti	V	Cr
LFP	0%	0.003 ± 3e-4	5e-6 ± 1e-5	0.007 ± 0.007	0.517 ± 0.059	0.297 ± 0.032	0.085 ± 0.024	0.797 ± 0.416	0.0 ± 3e-4	0.0 ± 3e-4	0.117 ± 0.032	0.016 ± 0.106	0.009 ± 0.001	7e-4 ± 3e-4	0.0 ± 3e-4
	30%	0.002 ± 3e-4	0.0 ± 1e-5	0.002 ± 0.002	0.531 ± 0.036	0.292 ± 0.022	0.086 ± 0.026	0.798 ± 0.228	4e-4 ± 4e-4	0.0 ± 3e-4	0.15 ± 0.038	0.007 ± 0.107	0.01 ± 0.001	6e-4 ± 3e-4	0.0 ± 4e-4
	50%	0.031 ± 0.019	4e-6 ± 1e-5	0.0 ± 0.001	0.689 ± 0.1	0.362 ± 0.047	0.0 ± 0.01	10.266 ± 1.477	0.0 ± 4e-4	0.0 ± 3e-4	0.168 ± 0.041	0.019 ± 0.125	0.013 ± 0.002	6e-4 ± 2e-4	0.0 ± 4e-4
	75%	0.013 ± 0.005	2e-6 ± 1e-5	0.0 ± 0.001	0.736 ± 0.099	0.381 ± 0.057	0.0 ± 0.01	10.675 ± 1.644	0.0 ± 4e-4	0.0 ± 3e-4	0.193 ± 0.04	0.016 ± 0.126	0.013 ± 0.002	5e-4 ± 1e-4	0.0 ± 5e-4
	100%	0.007 ± 0.001	0.0 ± 1e-5	0.016 ± 0.016	0.684 ± 0.061	0.374 ± 0.027	0.108 ± 0.048	2.436 ± 1.05	0.0 ± 3e-4	0.0 ± 3e-4	0.198 ± 0.031	0.011 ± 0.107	0.013 ± 0.001	9e-4 ± 2e-4	0.0 ± 5e-4
LCO	0%	0.001 ± 3e-4	0.0 ± 4e-6	1e-3 ± 1e-3	0.262 ± 0.024	0.277 ± 0.141	0.018 ± 0.018	3.294 ± 1.259	0.023 ± 0.012	0.0 ± 1e-4	0.069 ± 0.014	2e-5 ± 0.042	0.005 ± 7e-4	3e-4 ± 1e-4	0.0 ± 2e-4
	30%	8e-4 ± 2e-4	2e-7 ± 4e-6	6e-4 ± 8e-4	0.228 ± 0.023	0.126 ± 0.012	0.0 ± 0.003	2.344 ± 0.561	0.018 ± 0.008	0.0 ± 1e-4	0.064 ± 0.008	0.014 ± 0.042	0.004 ± 5e-4	3e-4 ± 7e-5	0.0 ± 2e-4
	60%	0.079 ± 0.034	1e-5 ± 1e-5	1e-4 ± 6e-4	0.22 ± 0.072	0.129 ± 0.034	0.0 ± 0.003	5.44 ± 0.364	0.017 ± 0.003	0.0 ± 1e-4	0.07 ± 0.025	0.005 ± 0.042	0.005 ± 8e-4	5e-4 ± 1e-4	0.0 ± 2e-4
	80%	0.28 ± 0.09	0.0 ± 3e-6	0.004 ± 0.003	0.166 ± 0.065	0.097 ± 0.03	0.0 ± 0.003	2.427 ± 0.728	0.015 ± 0.005	0.0 ± 1e-4	0.041 ± 0.018	0.011 ± 0.038	0.004 ± 8e-4	1e-4 ± 4e-5	0.0 ± 1e-4
	100%	0.68 ± 0.161	2e-7 ± 4e-6	0.01 ± 0.005	0.156 ± 0.073	0.14 ± 0.069	0.0 ± 0.004	2.345 ± 0.345	0.015 ± 0.002	0.0 ± 1e-4	0.042 ± 0.021	0.0 ± 0.048	0.004 ± 7e-4	4e-4 ± 2e-4	0.0 ± 2e-4
Cell Type	**Cell SOC**	**Mn**	**Fe**	**Co**	**Ni**	**Cu**	**Zn**	**Ga**	**As**	**Se**	**Br**	**Rb**	**Sr**	**Y**	**Zr**
LFP	0%	0.02 ± 0.003	0.116 ± 0.026	2e-4 ± 6e-5	0.004 ± 0.001	0.012 ± 0.004	0.059 ± 0.006	0.0 ± 0.002	7e-4 ± 4e-4	9e-4 ± 2e-4	0.006 ± 0.005	1e-4 ± 3e-5	4e-4 ± 2e-4	0.0 ± 0.002	3e-4 ± 0.005
	30%	0.023 ± 0.002	0.165 ± 0.019	3e-4 ± 8e-5	0.004 ± 5e-4	0.012 ± 0.005	0.089 ± 0.005	0.0 ± 0.002	3e-4 ± 1e-4	5e-4 ± 2e-4	0.007 ± 0.004	9e-5 ± 2e-5	3e-4 ± 2e-4	0.0 ± 0.002	0.0 ± 0.005
	50%	0.025 ± 0.003	0.084 ± 0.024	2e-4 ± 1e-4	0.006 ± 0.001	0.007 ± 0.002	0.032 ± 0.006	0.0 ± 0.002	7e-4 ± 5e-4	6e-4 ± 4e-4	0.0 ± 0.003	1e-4 ± 1e-5	6e-5 ± 3e-5	0.0 ± 0.002	0.0 ± 0.006
	75%	0.029 ± 0.003	0.32 ± 0.045	2e-4 ± 7e-5	0.009 ± 0.003	0.016 ± 0.008	0.053 ± 0.009	0.0 ± 0.002	5e-4 ± 3e-4	4e-4 ± 4e-4	0.0 ± 0.003	9e-5 ± 2e-5	5e-5 ± 4e-5	0.0 ± 0.002	0.002 ± 0.006
	100%	0.024 ± 0.003	0.236 ± 0.117	4e-4 ± 2e-4	0.004 ± 0.001	0.012 ± 0.005	0.053 ± 0.01	0.0 ± 0.002	0.001 ± 5e-4	4e-4 ± 4e-4	9e-4 ± 0.002	1e-4 ± 2e-5	4e-4 ± 3e-4	0.0 ± 0.002	0.001 ± 0.005
LCO	0%	0.01 ± 0.001	0.074 ± 0.011	3e-4 ± 1e-4	0.002 ± 4e-4	8e-4 ± 4e-4	0.052 ± 0.012	0.0 ± 7e-4	7e-5 ± 6e-5	4e-4 ± 2e-4	1e-4 ± 9e-4	3e-5 ± 6e-6	1e-4 ± 3e-5	1e-4 ± 6e-4	0.001 ± 0.002
	30%	0.007 ± 4e-4	0.035 ± 0.004	5e-4 ± 3e-4	0.001 ± 5e-4	0.006 ± 0.002	0.03 ± 0.007	3e-4 ± 8e-4	8e-5 ± 6e-5	1e-4 ± 7e-5	0.0 ± 9e-4	3e-5 ± 7e-6	1e-4 ± 4e-5	2e-4 ± 6e-4	4e-5 ± 0.002
	60%	0.009 ± 5e-4	0.042 ± 0.014	0.013 ± 0.007	0.002 ± 1e-4	0.004 ± 0.001	0.025 ± 0.002	0.0 ± 7e-4	2e-4 ± 1e-4	3e-4 ± 1e-4	0.0 ± 9e-4	7e-5 ± 4e-5	1e-4 ± 6e-5	2e-5 ± 6e-4	0.003 ± 0.002
	80%	0.009 ± 6e-4	0.042 ± 0.015	0.049 ± 0.021	0.002 ± 2e-4	0.005 ± 0.003	0.041 ± 0.01	0.0 ± 7e-4	2e-5 ± 1e-5	7e-5 ± 4e-5	6e-4 ± 8e-4	3e-5 ± 6e-6	7e-5 ± 5e-5	0.0 ± 6e-4	4e-4 ± 0.002
	100%	0.009 ± 8e-4	0.044 ± 0.005	0.066 ± 0.012	0.002 ± 3e-4	0.005 ± 0.004	0.042 ± 0.003	0.0 ± 9e-4	2e-5 ± 2e-5	1e-4 ± 1e-4	0.0 ± 1e-3	2e-5 ± 4e-6	1e-4 ± 6e-5	0.0 ± 7e-4	0.0 ± 0.002

Table S5 (continued).

Cell Type	Cell SOC	Nb	Mo	Pd	Ag	Cd	In	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd
LFP	0%	5e-4 ± 3e-4	0.001 ± 4e-4	1e-4 ± 1e-4	1e-4 ± 9e-5	4e-5 ± 4e-5	5e-4 ± 0.009	0.0 ± 2e-4	0.006 ± 7e-4	2e-5 ± 2e-5	7e-4 ± 0.002	5e-5 ± 4e-5	1e-4 ± 4e-5	3e-5 ± 3e-5	6e-5 ± 3e-5
	30%	2e-4 ± 1e-4	9e-4 ± 2e-4	0.0 ± 3e-5	4e-5 ± 2e-5	8e-6 ± 8e-6	0.005 ± 0.009	0.0 ± 2e-4	0.004 ± 7e-4	0.0 ± 3e-6	6e-4 ± 0.002	4e-5 ± 2e-5	1e-4 ± 4e-5	0.0 ± 1e-6	3e-5 ± 6e-6
	50%	2e-4 ± 1e-4	6e-4 ± 2e-4	3e-4 ± 3e-4	4e-5 ± 2e-5	4e-6 ± 9e-6	0.003 ± 0.011	0.0 ± 1e-4	0.003 ± 4e-4	2e-6 ± 4e-6	0.0 ± 6e-4	3e-5 ± 8e-6	8e-5 ± 1e-5	0.0 ± 2e-6	4e-5 ± 5e-6
	75%	3e-4 ± 2e-4	0.001 ± 2e-4	0.0 ± 3e-5	4e-5 ± 6e-6	4e-6 ± 9e-6	0.0 ± 0.011	0.0 ± 1e-4	0.003 ± 2e-4	0.0 ± 3e-6	0.003 ± 0.003	3e-5 ± 2e-5	9e-5 ± 4e-5	0.0 ± 2e-6	4e-5 ± 2e-5
	100%	4e-4 ± 2e-4	0.001 ± 3e-4	6e-5 ± 6e-5	2e-4 ± 1e-4	6e-5 ± 6e-5	0.003 ± 0.009	0.0 ± 1e-4	0.003 ± 3e-4	0.0 ± 3e-6	0.003 ± 0.003	3e-5 ± 6e-6	9e-5 ± 1e-5	0.0 ± 1e-6	4e-5 ± 4e-6
LCO	0%	1e-4 ± 7e-5	3e-4 ± 5e-5	2e-5 ± 2e-5	2e-5 ± 3e-6	5e-5 ± 2e-5	9e-4 ± 0.004	0.0 ± 8e-5	6e-4 ± 6e-5	0.0 ± 1e-6	0.0 ± 4e-4	1e-5 ± 3e-6	3e-5 ± 7e-6	0.0 ± 5e-7	1e-5 ± 3e-6
	30%	8e-5 ± 5e-5	2e-4 ± 5e-5	0.003 ± 0.003	1e-5 ± 4e-6	4e-5 ± 2e-5	1e-3 ± 0.004	0.0 ± 6e-5	6e-4 ± 2e-4	0.0 ± 1e-6	0.0 ± 5e-4	9e-6 ± 4e-6	3e-5 ± 9e-6	0.0 ± 5e-7	1e-5 ± 3e-6
	60%	8e-5 ± 5e-5	3e-4 ± 5e-5	2e-4 ± 2e-4	1e-5 ± 3e-6	7e-5 ± 3e-5	8e-5 ± 0.004	0.0 ± 6e-5	5e-4 ± 7e-5	2e-5 ± 2e-5	0.0 ± 4e-4	3e-5 ± 2e-5	4e-5 ± 2e-5	2e-5 ± 2e-5	3e-5 ± 2e-5
	80%	7e-5 ± 5e-5	3e-4 ± 5e-5	1e-4 ± 9e-5	3e-5 ± 1e-5	1e-4 ± 9e-6	0.002 ± 0.003	0.0 ± 5e-5	6e-4 ± 9e-5	0.0 ± 1e-6	0.0 ± 4e-4	4e-6 ± 2e-6	1e-5 ± 5e-6	0.0 ± 4e-7	6e-6 ± 3e-6
	100%	2e-4 ± 1e-4	3e-4 ± 6e-5	2e-4 ± 2e-4	3e-5 ± 2e-5	1e-4 ± 9e-6	0.002 ± 0.004	0.0 ± 6e-5	5e-4 ± 5e-5	0.0 ± 1e-6	0.0 ± 3e-4	5e-6 ± 2e-6	2e-5 ± 8e-6	0.0 ± 6e-7	1e-5 ± 5e-6

Cell Type	Cell SOC	Sm	Eu	Tb	Hf	Ta	W	Ir	Pt	Au	Hg	Tl	Pb	Bi	Th	U
LFP	0%	2e-5 ± 2e-5	0.007 ± 0.07	0.0 ± 0.112	0.0 ± 0.047	5e-4 ± 5e-4	8e-4 ± 7e-4	0.0 ± 0.016	0.001 ± 3e-4	0.002 ± 0.006	0.005 ± 0.006	0.0 ± 9e-6	4e-4 ± 2e-4	0.0 ± 2e-5	0.0 ± 1e-5	1e-6 ± 5e-6
	30%	0.0 ± 4e-6	0.0 ± 0.07	0.022 ± 0.112	0.0 ± 0.047	3e-5 ± 5e-5	3e-4 ± 3e-4	0.0 ± 0.016	0.001 ± 3e-4	0.0 ± 0.006	0.0 ± 0.006	0.0 ± 3e-6	9e-4 ± 3e-4	0.0 ± 8e-6	0.0 ± 3e-6	4e-6 ± 5e-6
	50%	0.0 ± 5e-6	0.003 ± 0.083	0.081 ± 0.132	0.0 ± 0.055	6e-5 ± 7e-5	1e-4 ± 4e-5	0.0 ± 0.018	0.001 ± 3e-4	0.0 ± 0.007	0.003 ± 0.007	0.0 ± 3e-5	3e-4 ± 8e-5	0.0 ± 1e-4	0.0 ± 3e-5	6e-7 ± 6e-6
	75%	4e-6 ± 5e-6	0.014 ± 0.083	0.05 ± 0.132	0.0 ± 0.055	1e-4 ± 1e-4	2e-4 ± 6e-5	0.0 ± 0.018	0.002 ± 4e-4	0.004 ± 0.007	7e-4 ± 0.007	0.0 ± 4e-6	8e-4 ± 5e-4	2e-4 ± 2e-4	0.0 ± 3e-6	0.0 ± 5e-6
	100%	0.0 ± 4e-6	0.005 ± 0.071	0.036 ± 0.113	0.0 ± 0.047	2e-4 ± 2e-4	4e-4 ± 2e-4	0.0 ± 0.016	0.001 ± 3e-4	8e-5 ± 0.006	0.002 ± 0.006	0.0 ± 3e-6	7e-4 ± 3e-4	0.0 ± 7e-6	0.0 ± 3e-6	0.0 ± 4e-6
LCO	0%	0.0 ± 2e-6	0.008 ± 0.029	0.024 ± 0.043	0.0 ± 0.019	3e-5 ± 3e-5	5e-5 ± 3e-5	0.0 ± 0.006	4e-4 ± 1e-4	8e-5 ± 0.002	1e-3 ± 0.002	0.0 ± 1e-6	6e-5 ± 4e-5	0.0 ± 2e-6	0.0 ± 1e-6	0.0 ± 2e-6
	30%	0.0 ± 2e-6	0.0 ± 0.028	0.013 ± 0.044	0.0 ± 0.018	3e-6 ± 1e-5	5e-6 ± 5e-6	0.0 ± 0.006	4e-4 ± 9e-5	0.0 ± 0.002	0.0 ± 0.002	0.0 ± 1e-6	4e-4 ± 2e-4	0.0 ± 3e-6	0.0 ± 2e-6	0.0 ± 1e-6
	60%	2e-5 ± 2e-5	0.0 ± 0.029	0.004 ± 0.043	0.0 ± 0.018	1e-5 ± 2e-5	2e-5 ± 2e-5	0.0 ± 0.006	3e-4 ± 7e-5	1e-4 ± 0.002	0.001 ± 0.002	0.0 ± 1e-5	2e-4 ± 3e-5	0.0 ± 3e-5	9e-6 ± 1e-5	8e-6 ± 8e-6
	80%	0.0 ± 2e-6	0.005 ± 0.025	0.004 ± 0.04	0.0 ± 0.017	1e-5 ± 2e-5	4e-6 ± 2e-6	0.0 ± 0.006	4e-4 ± 8e-5	9e-4 ± 0.002	5e-4 ± 0.002	0.0 ± 2e-6	6e-4 ± 3e-4	0.0 ± 5e-6	0.0 ± 2e-6	0.0 ± 1e-6
	100%	0.0 ± 2e-6	0.0 ± 0.032	0.0 ± 0.051	0.0 ± 0.021	2e-4 ± 1e-4	2e-4 ± 2e-4	0.0 ± 0.007	3e-4 ± 8e-5	0.0 ± 0.003	2e-4 ± 0.003	0.0 ± 2e-6	0.001 ± 2e-4	0.0 ± 6e-6	0.0 ± 3e-6	0.0 ± 2e-6

Table S6. A comparison of cell mass loss rates to the literature values.

Source	Cell Type	SOC	Mass Lost (%)	PM/Cell Mass (%)	PM/Lost Mass (%)	PM Size
This Study	**LFP Cylinder**	**0%**	20	1.22	6.1	$PM_{2.5}$
		30%	20	1.01	5.1	
		50%	17	0.59	3.5	
		75%	20	0.76	3.8	
		100%	20	0.77	3.9	
This Study	**LCO Pouch**	**0%**	21	0.72	3.4	$PM_{2.5}$
		30%	21	0.70	3.3	
		60%	20	0.88	4.4	
		80%	22	0.88	4.0	
		100%	23	0.69	3.0	
[1]	**NMC Pouch**	**100%**	15–55	13–37		All sizes
	NMC Hard Case	**100%**	35–60	27–50		
[2]	**NMC Prismatic**	**100%**		11.2		Settleable, 0–8 mm
[3]	**NMC Prismatic**	**100%**	28.5	4.9	17	Settleable, >2.9 μm
[4]	**NMC/LMO**	**0 and 30%**	15			All sizes
	NMC/LMO	**100%**	43	34	79	

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