Appendix E1

SEM/EDS Data for Test #3 Day-30 Aluminum Coupons

List of Figures

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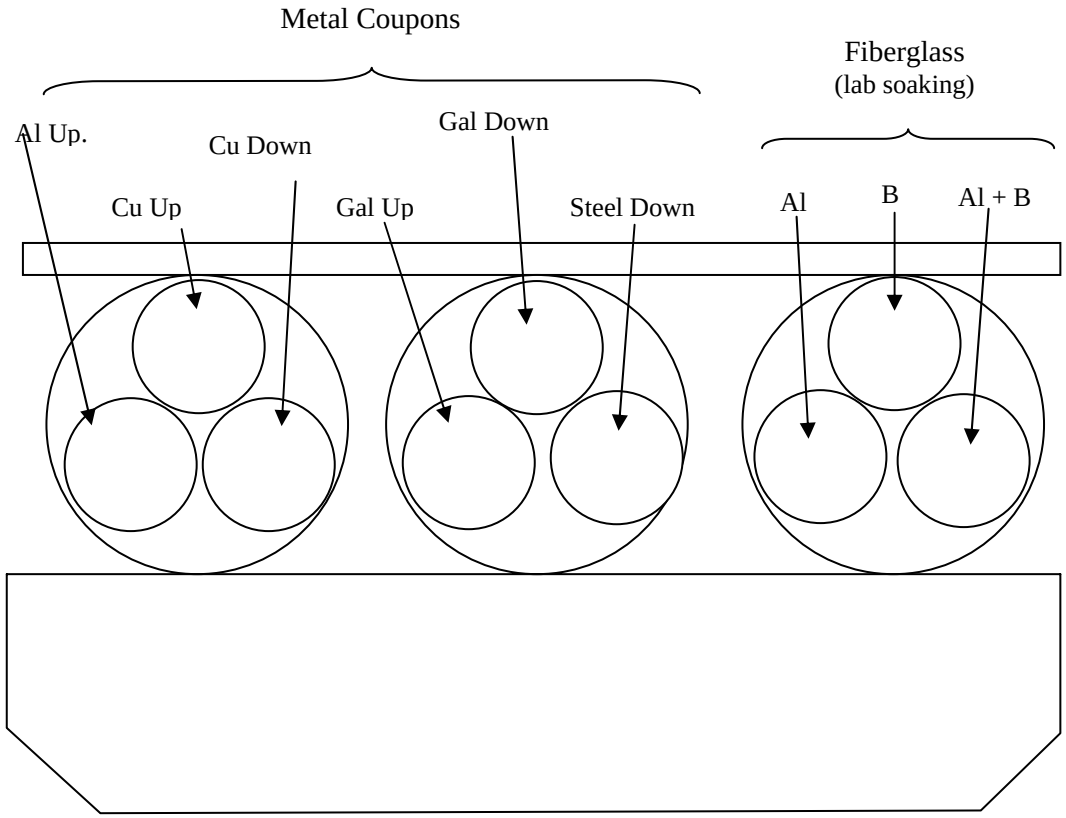
This appendix presents SEM/EDS results for metal aluminum coupons described by two different exposure categories: (1) suspended; (2) submerged. *Suspended* refers to the coupons located above the water level of the solution during the ICET tests. Suspended coupons were only contacted by the solution during the 4-hour spray period at initiation of the test. In addition, the surface of the suspended coupons may be affected by moisture in the test chamber vapor space. *Submerged* refers to coupons that were immersed in the solution for the duration of the test.

The coupon samples were collected on May 5, 2005 (the date Test #3 was shut down) and were later examined by SEM/EDS. The aluminum coupon samples were dried in air before coating with Au/Pd for SEM examination. SEM results present the surface condition of the aluminum coupons. In addition, EDS results provide a semi-quantitative elemental analysis of the coupon surface and the corrosion products. Available logbook entries for this laboratory session are included in this appendix as transcribed notes.

Transcribed Laboratory Log

Laboratory session from May 17, 2005.
Test #3 Day-30 Metal Coupons



Suspended Al

Image:	T3D30AlSusp006	100 ×	SEM image	Figure E1-1
	T3D30AlSusp007	1000 ×	SEM image higher magnification	Figure E1-2
	T3D30AlSusp008	1000 ×	Backscattered image	Figure E1-3
EDS:	T3D30SuspAl05		Particles on 007	Figure E1-4
	T3D30SuspAl06		Surface on 007	Figure E1-5

Submerged Aluminum

Image:	T3D30AlSubm029	100 ×	SEM image	Figure E1-6
	T3D30AlSubm030	100 ×	Annotated backscatter SEM	Figure E1-7
EDS:	T3D30SubmAl17		Grey surface on 030	Figure E1-8
	T3D30SubmAl18		Dark spot on 030	Figure E1-9
Image:	T3D30AlSubm031	100 ×		Figure E1-10
	T3D30AlSubm032	500 ×		Figure E1-11

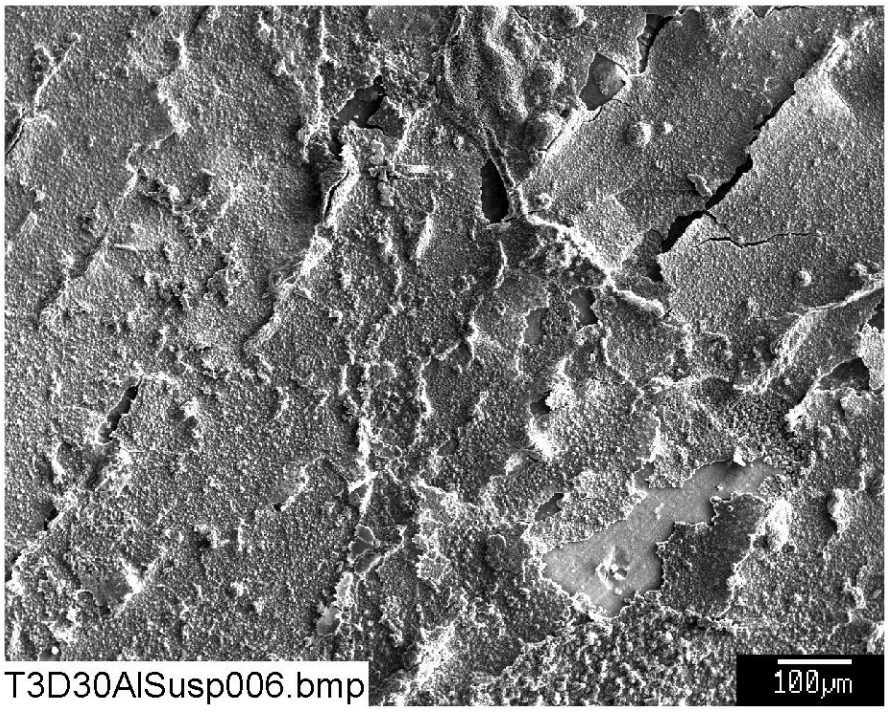


Figure E1-1: SEM image magnified 100 times for a Test #3 Day-30 suspended Aluminum coupon. (T3D30AlSusp006)

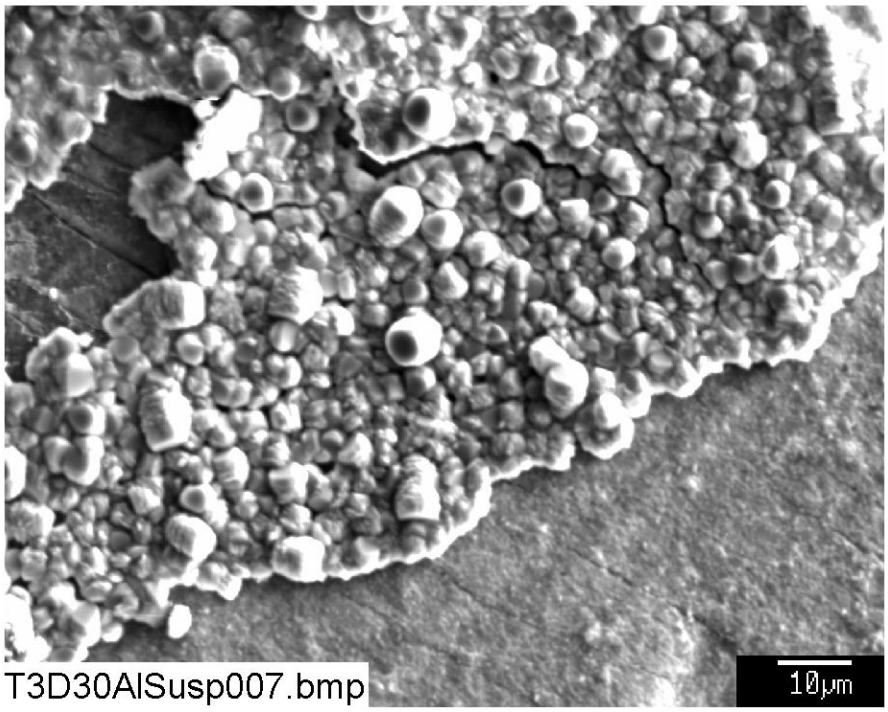


Figure E1-2: SEM image magnified 1000 times for a Test #3 Day-30 suspended Aluminum coupon. (T3D30AlSusp007)

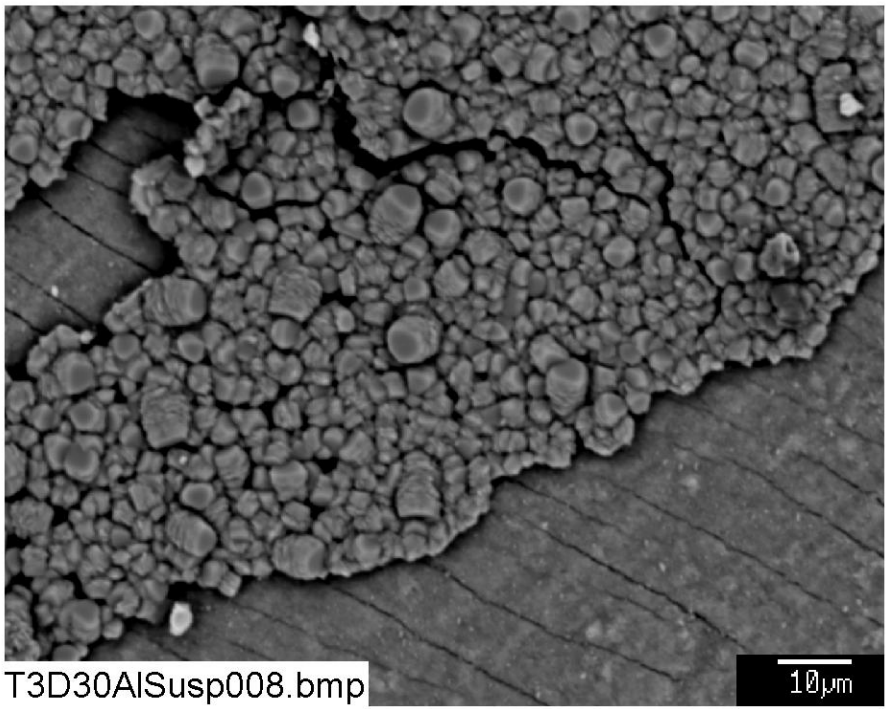


Figure E1-3: Backscattered SEM image magnified 1000 times for a Test #3 Day-30 suspended Aluminum coupon. (T3D30AlSusp008)

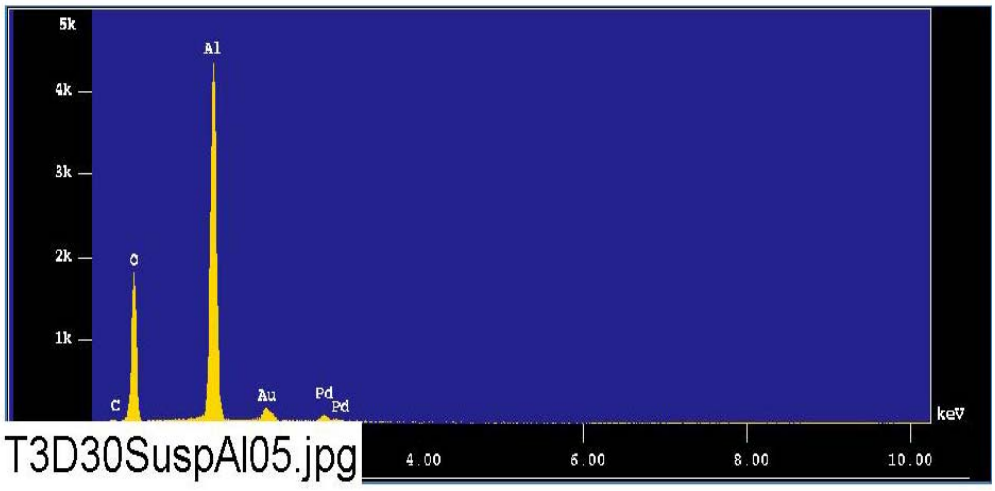


Figure E1-4: EDS counting spectrum for the particles shown in Figure E1-2. (T3D30SuspAl05)

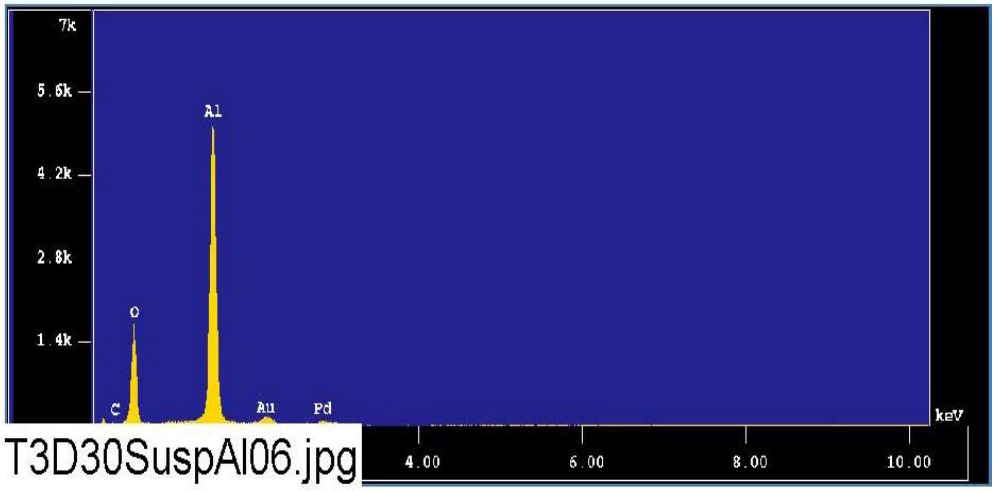


Figure E1-5: EDS counting spectrum for the surface shown in Figure E1-2. (T3D30SuspAl06)

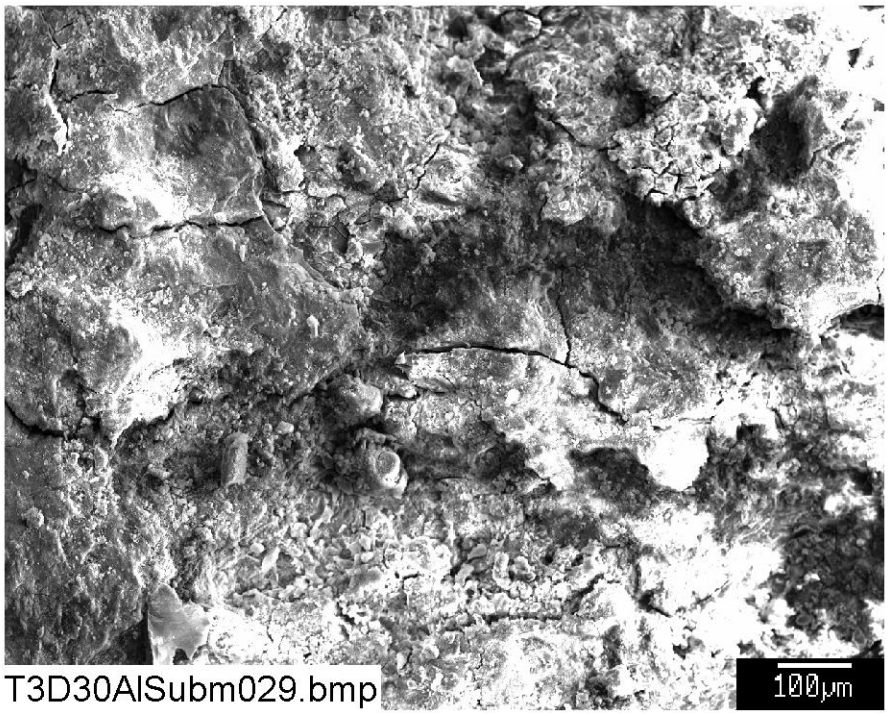


Figure E1-6: SEM image magnified 100 times for a Test #3 Day-30 submerged Aluminum coupon. (T3D30AlSubm029)

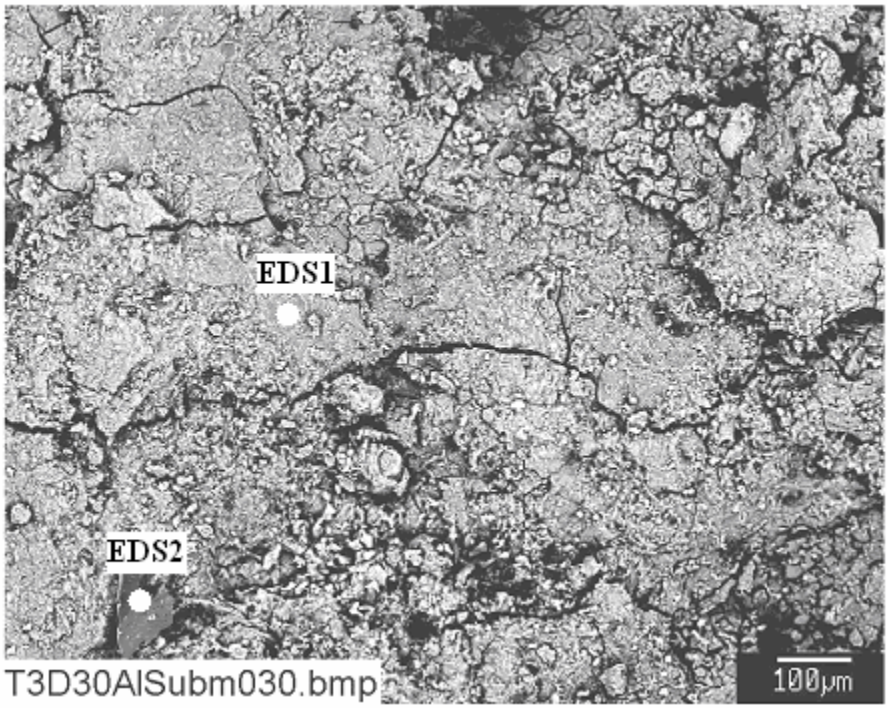


Figure E1-7: Annotated backscattered SEM image magnified 100 times for a Test #3 Day-30 submerged Aluminum coupon. (T3D30AlSubm030)

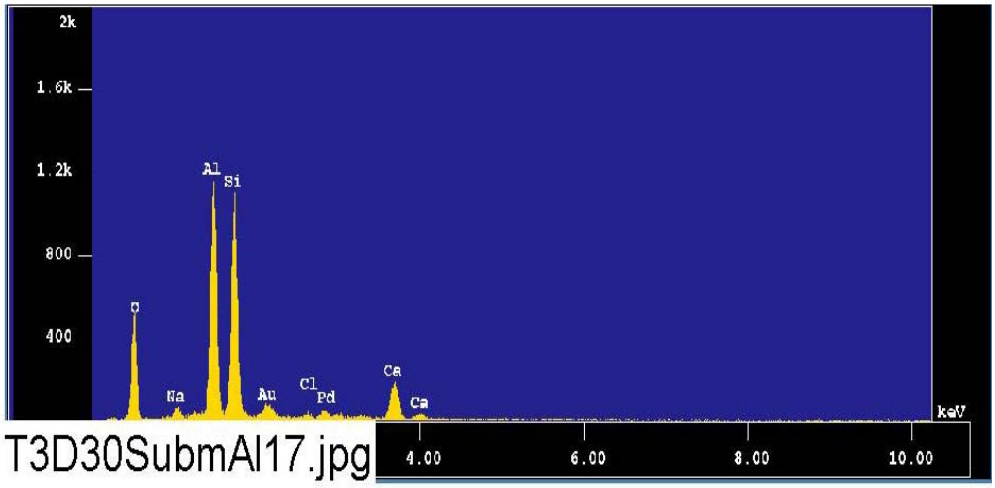


Figure E1-8: EDS counting spectrum for the grey surface (EDS 1) shown in Figure E1-7. (T3D30SubmAl17)

The results from the chemical composition analysis for T3D30SubmAl17 are given in Table E1-1.

Table E1-1. Chemical Compositions for T3D30SubmAl17, Figure E1-8

May 17 2005

Group : NRC
Sample : T3D30 ID# : 20
Comment : Submerged Al grey surface
Condition : Full Scale : 20KeV(10eV/ch,2Kch)
Live Time : 60.000 sec Aperture # : 2
Acc. Volt : 15.0 KV Probe Current : 7.746E-09 A
Stage Point : X=14.568 Y=53.830 Z=11.000
Acq. Date : Tue May 17 15:13:52 2005

Element	Mode	ROI(KeV)	K-ratio(%)	+/-	Net/Background
O K	Normal	0.25- 0.77	14.6772	0.0027	3531 / 18
Na K	Normal	0.81- 1.27	0.5575	0.0008	385 / 26
Al K	Normal	1.26- 1.78	9.9625	0.0017	9945 / 200
Si K	Normal	1.50- 2.05	9.6207	0.0009	8956 / 486
Ca K	Normal	3.40- 4.30	3.5591	0.0080	1610 / 18
Cl K	Normal	2.34- 3.06	0.4826	0.0007	308 / 28

Chi_square = 38.5655

Element	Mass%	Atomic%	ZAF	Z	A	F
O	39.310	53.7531	1.2511	0.9885	1.2656	1.0000
Na	1.470	1.3989	1.2317	1.0429	1.1833	0.9980
Al	22.707	18.4115	1.0647	1.0041	1.0675	0.9934
Si	27.544	21.4549	1.3373	0.9921	1.3483	0.9998
Ca	7.761	4.2363	1.0186	1.0000	1.0185	1.0001
Cl	1.208	0.7453	1.1692	1.0450	1.1209	0.9982
Total	100.000	100.0000				

Normalization factor = 2.1408

Fe	2.399	1.5375	0.9896	1.0503	1.0060	0.9366
Total	100.000	100.0000				

Normalization factor = 3.2486

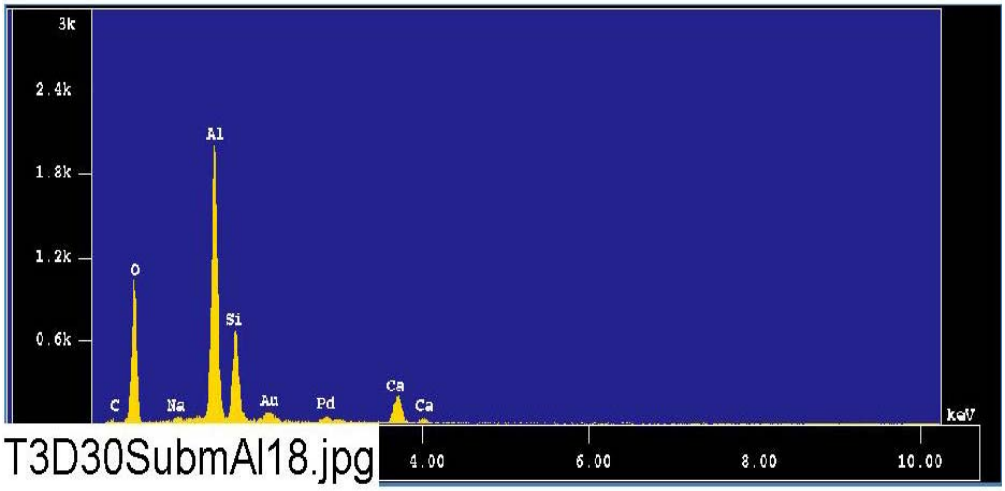


Figure E1-9: EDS counting spectrum for the dark spot (EDS2) shown in Figure E1-7. (T3D30SubmAl18)

The results from the chemical composition analysis for T3D30SubmAl18 are given in Table E1-2.

Table E1-2. Chemical Compositions for T3D30SubmAl18,Figure E1-9.

May 17 2005

Group : NRC
Sample : T3D30 ID# : 21
Comment : Submerged Al dark surface
Condition : Full Scale : 20KeV(10eV/ch,2Kch)
Live Time : 60.000 sec Aperture # : 2
Acc. Volt : 15.0 KV Probe Current : 7.728E-09 A
Stage Point : X=14.568 Y=53.830 Z=11.000
Acq. Date : Tue May 17 15:18:41 2005

Element	Mode	ROI(KeV)	K-ratio(%)	+/-	Net/Background
O K	Normal	0.25- 0.77	27.8853	0.0036	6693 / 39
Al K	Normal	1.26- 1.78	16.9485	0.0022	16880 / 180
Si K	Normal	1.50- 2.05	6.0037	0.0008	5576 / 814
Ca K	Normal	3.40- 4.30	4.1252	0.0085	1862 / 16
Na K	Normal	0.81- 1.27	0.2751	0.0008	190 / 40
C K	Normal	0.09- 0.46	0.0000	0.0000	0 / 154

Chi_square = 70.9798

Element	Mass%	Atomic%	ZAF	Z	A	F
O	49.003	63.0911	1.0832	0.9889	1.0954	1.0000
Al	29.742	22.7054	1.0817	1.0048	1.0798	0.9970
Si	13.942	10.2255	1.4315	0.9929	1.4419	0.9999
Ca	6.739	3.4632	1.0069	1.0015	1.0053	1.0001
Na	0.575	0.5148	1.2875	1.0436	1.2361	0.9980
C	0.000	0.0000	6.5476	1.0370	6.3144	1.0000
Total	100.000	100.0000				

Normalization factor = 1.6223

Fe	2.399	1.5375	0.9896	1.0503	1.0060	0.9366
Total	100.000	100.0000				

Normalization factor = 3.2486

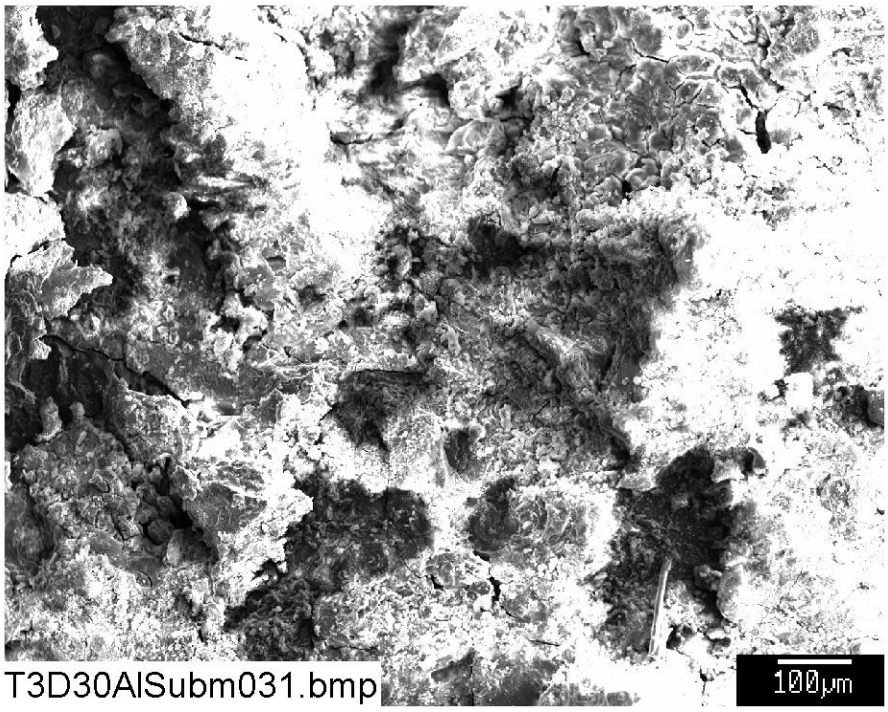


Figure E1-10: SEM image magnified 100 times for a Test #3 Day-30 submerged aluminum coupon. (T3D30AlSubm031)

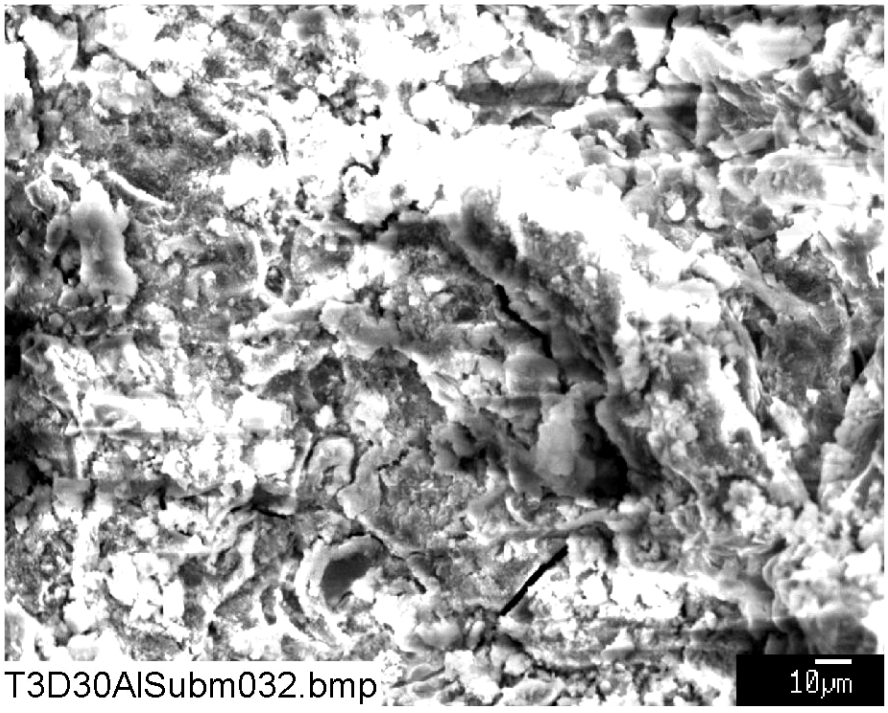


Figure E1-11: SEM image magnified 500 times for a Test #3 Day-30 submerged aluminum coupon. (T3D30AlSubm032)