

Appendix A

Microstructure of Heat-Resistant Alloys

Addendum to Chapter 3

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A supplementary material to the dissertation entitled
“Metal Dusting of Heat-Resistant Alloys”
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1 Introduction

This appendix should be read in conjunction with Chapter 3. The alloy microstructures were examined after each exposure to investigate the resulting changes, if any. These analyses were carried out under the assumption that the sample cores were not influenced by the surrounding environments. Indeed, the microstructures examined after 100 and 1000h were obtained from specimens exposed to air whilst those investigated after 500h were from alloys tested in the gas mixture.

2 XRD of Virgin Alloys

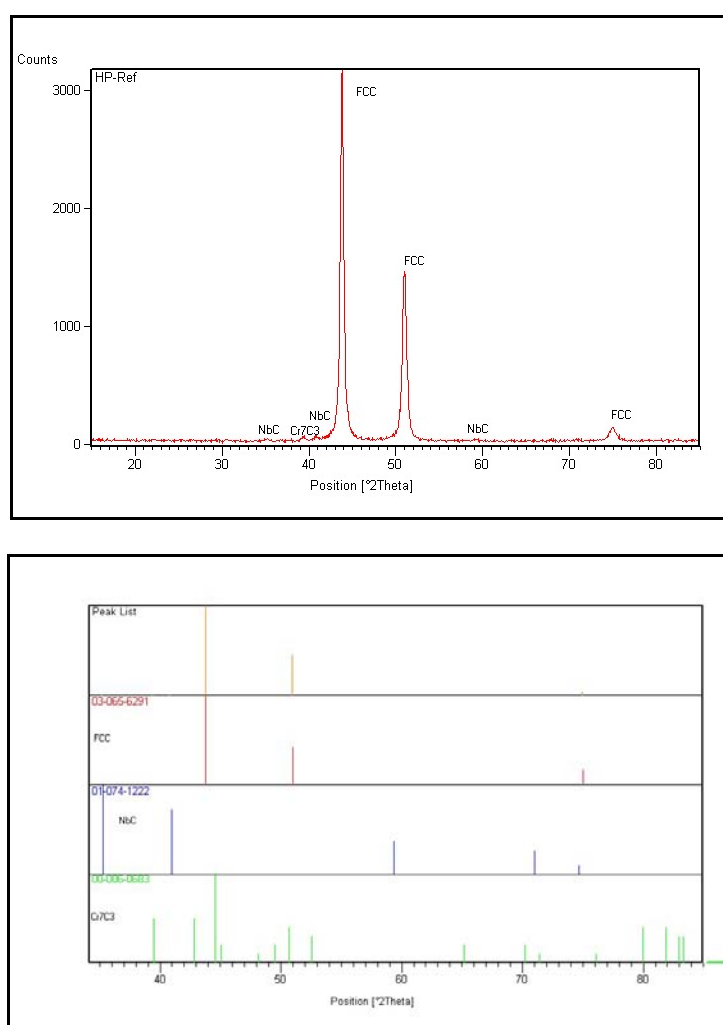


Figure 2.1 XRD pattern of alloy HP.

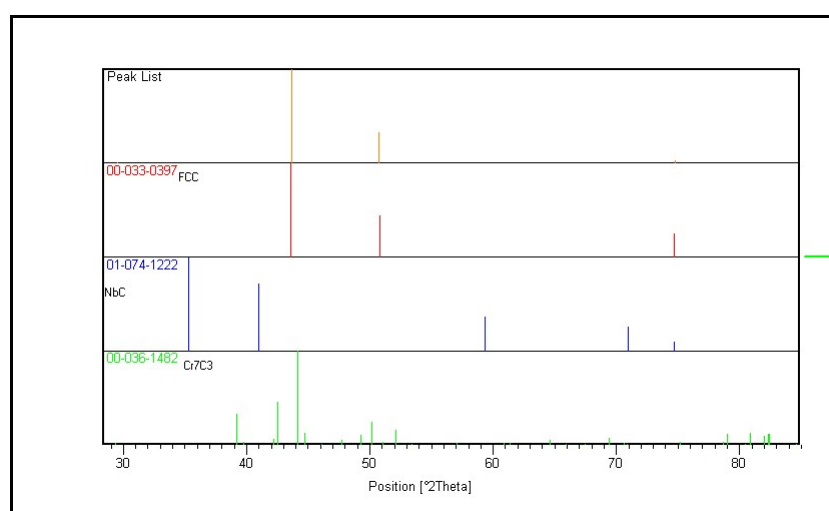
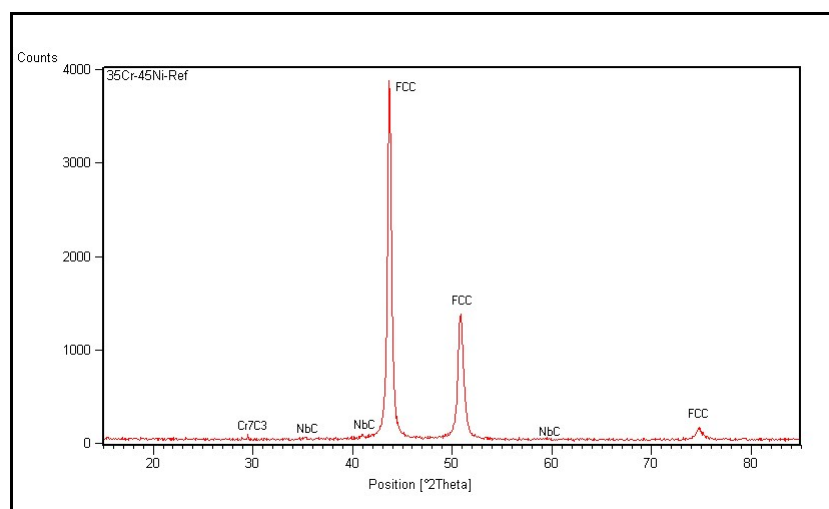


Figure 2.2 XRD pattern of alloy 35Cr-45Ni.

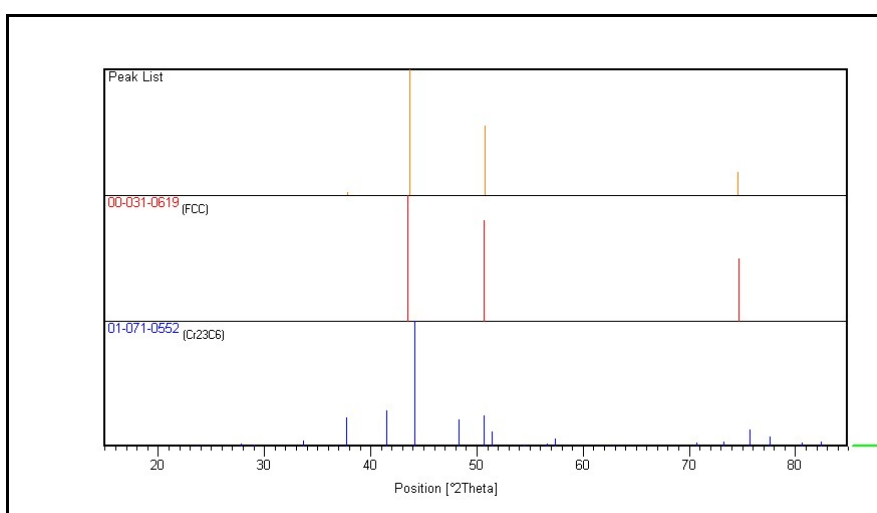
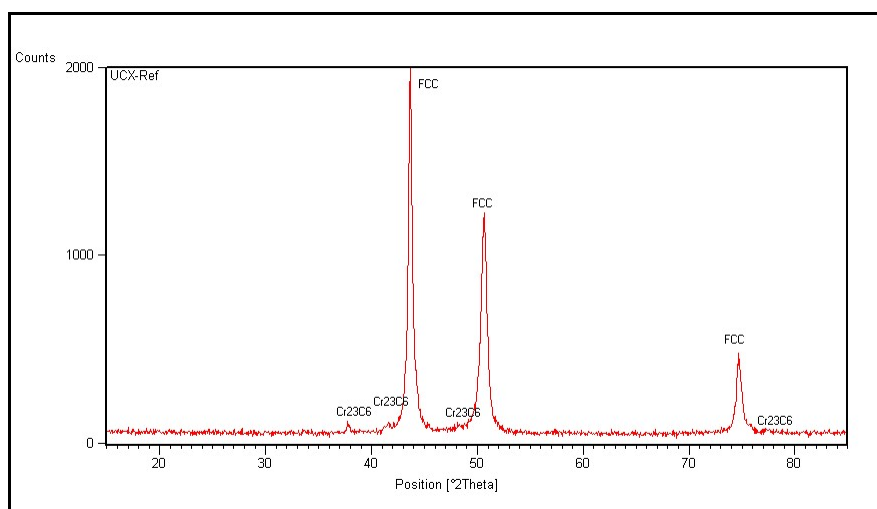
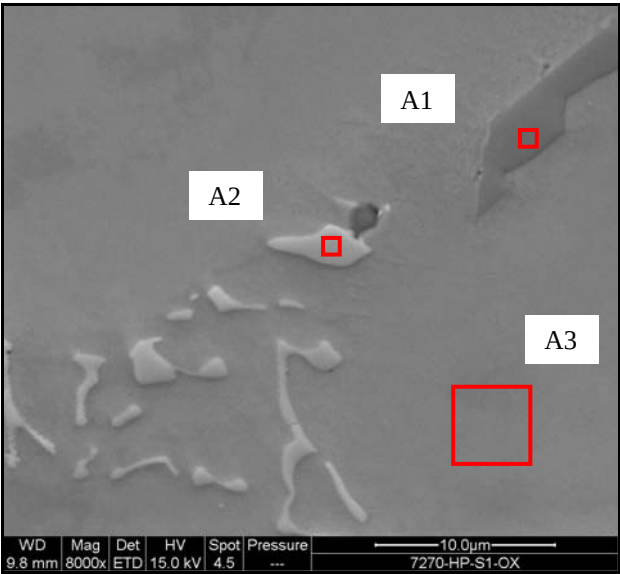
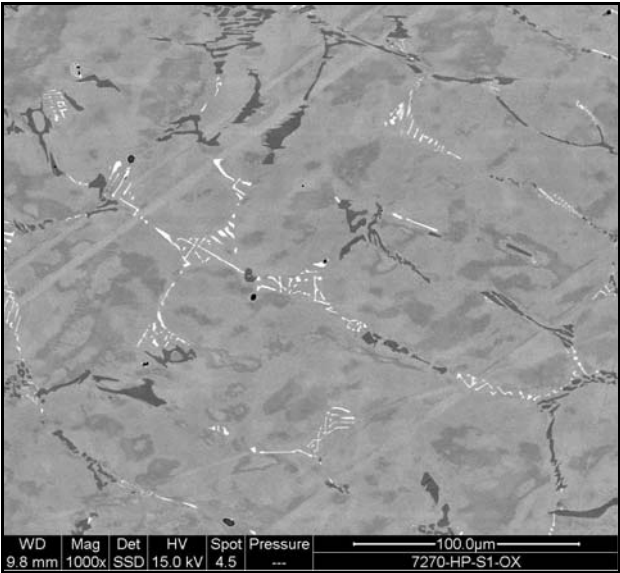


Figure 2.3 XRD pattern of alloy UCX.

3 **Microstructure of HP**

3.1 **HP after 100h at 650°C**



A1

A2

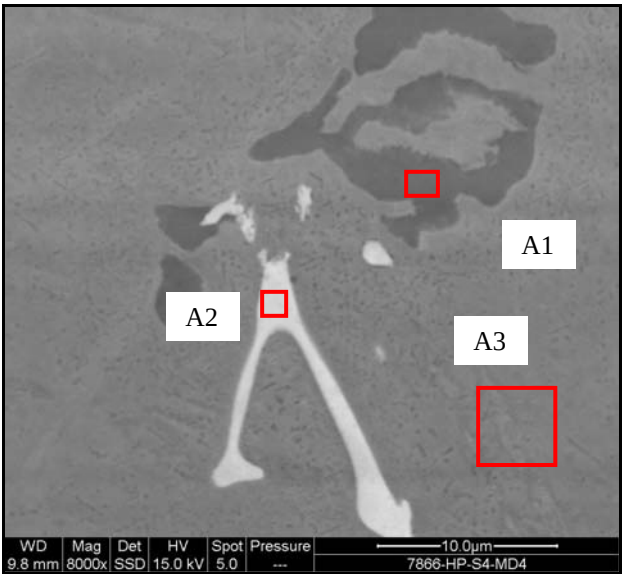
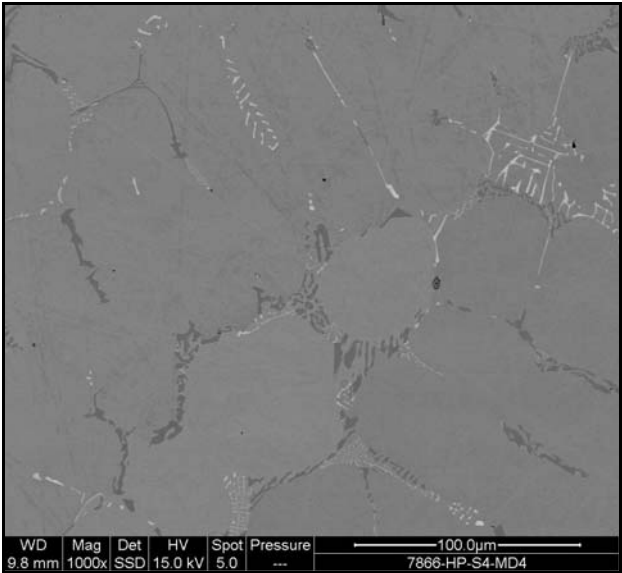
A3

Element	Weight%	Atomic%
C K	9.58	30.16
O K	2.82	6.67
Cr K	77.49	56.37
Mn K	1.01	0.70
Fe K	7.49	5.08
Ni K	1.60	1.03
Totals	100.00	

Element	Weight%	Atomic%
C K	7.53	32.28
O K	1.54	4.95
Si K	0.58	1.07
Cr K	10.00	9.91
Fe K	10.22	9.42
Ni K	10.83	9.50
Nb L	59.31	32.88
Totals	100.00	

Element	Weight%	Atomic%
C K	1.19	5.07
O K	1.36	4.33
Si K	1.65	2.99
Cr K	24.10	23.65
Mn K	0.85	0.79
Fe K	35.07	32.05
Ni K	35.79	31.11
Totals	100.00	

3.2 HP after 500h at 650°C



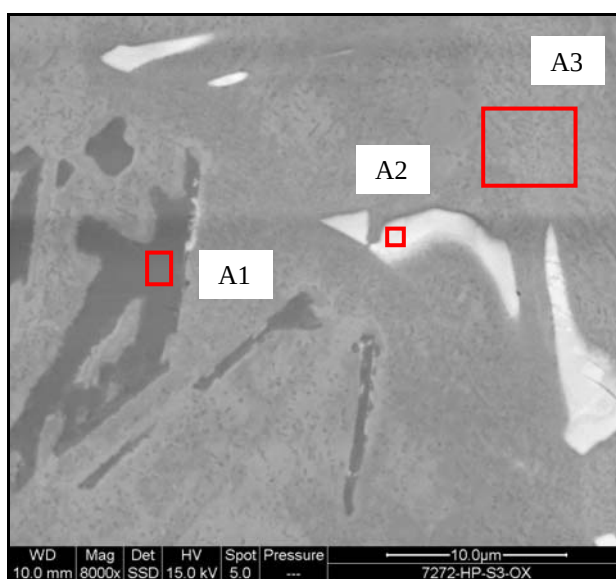
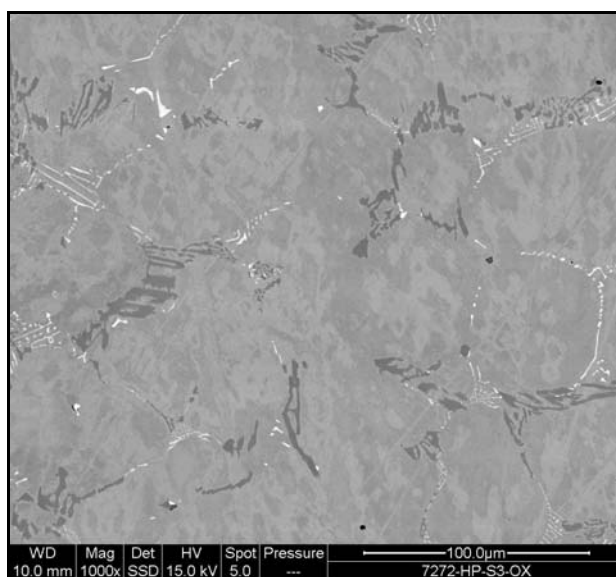
A1

A2

A3

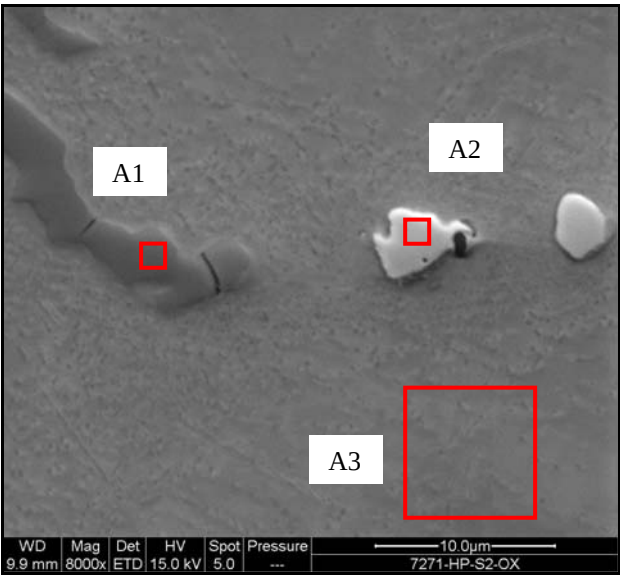
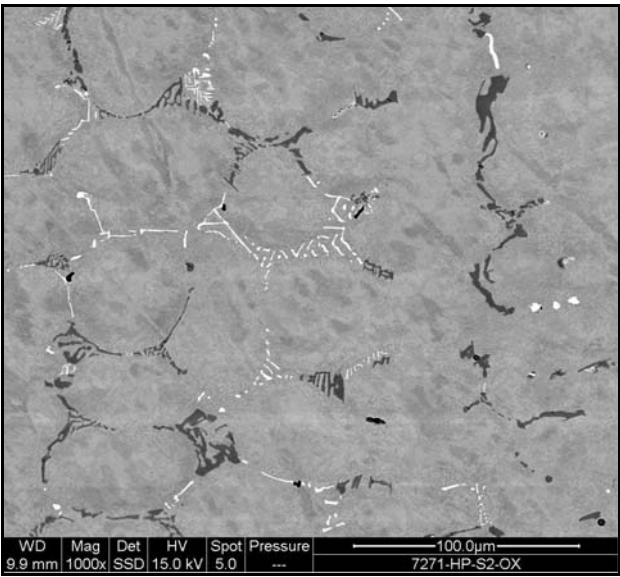
Element	Weight%	Atomic%	Element	Weight%	Atomic%	Element	Weight%	Atomic%
C K	9.46	29.60	C K	10.35	42.48	C K	1.00	4.21
O K	3.44	8.09	O K	1.47	4.52	O K	1.96	6.19
Cr K	75.09	54.30	Si K	0.43	0.76	Si K	2.00	3.59
Fe K	9.79	6.59	Cr K	6.47	6.13	Cr K	23.92	23.23
Ni K	2.21	1.42	Fe K	4.39	3.87	Mn K	1.02	0.94
			Ni K	4.67	3.92	Fe K	34.99	31.64
			Nb L	72.21	38.30	Ni K	35.11	30.20
Totals	100.00		Totals	100.00		Totals	100.00	

3.3 HP after 1000h at 650°C



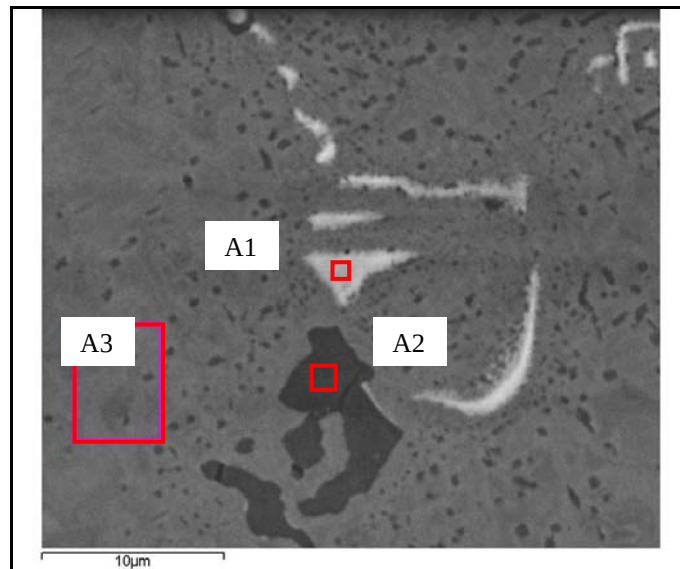
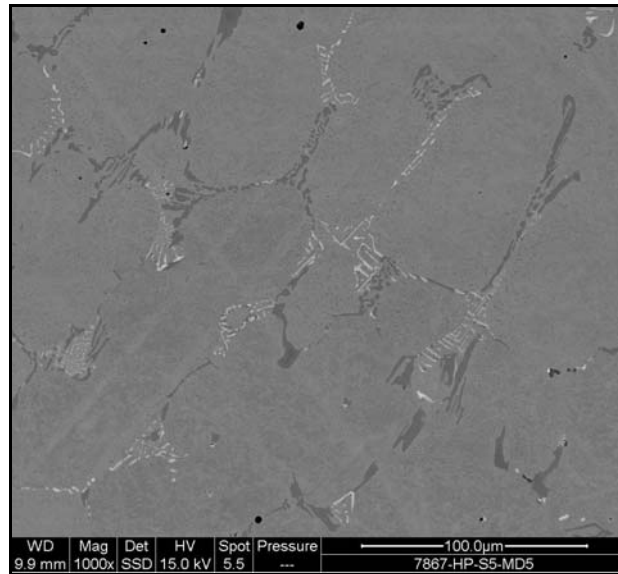
A1			A2			A3		
Element	Weight%	Atomic%	Element	Weight%	Atomic%	Element	Weight%	Atomic%
C K	10.42	32.03	C K	11.10	44.66	C K	1.34	5.65
O K	3.07	7.09	O K	1.62	4.90	O K	1.43	4.51
Cr K	75.76	53.81	Si K	0.41	0.70	Si K	1.86	3.35
Fe K	9.24	6.11	Cr K	6.20	5.77	Cr K	25.16	24.49
Ni K	1.51	0.95	Fe K	2.70	2.34	Fe K	33.06	29.96
			Ni K	3.53	2.91	Ni K	37.16	32.04
			Nb L	74.44	38.73			
Totals	100.00		Totals	100.00		Totals	100.00	

3.4 HP after 100h at 750°C



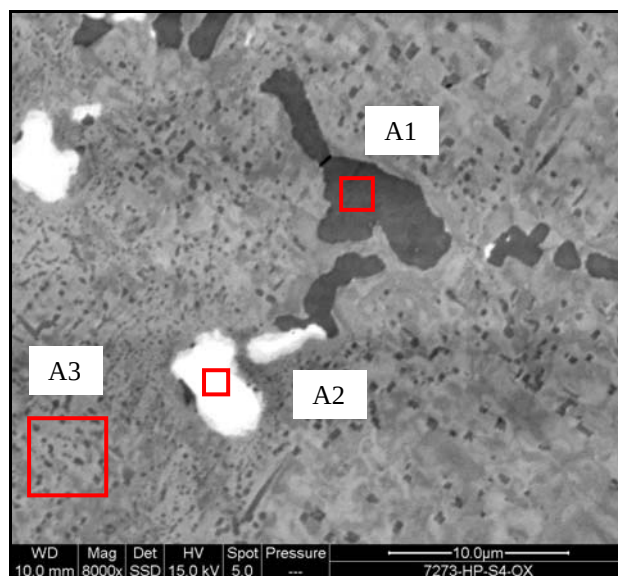
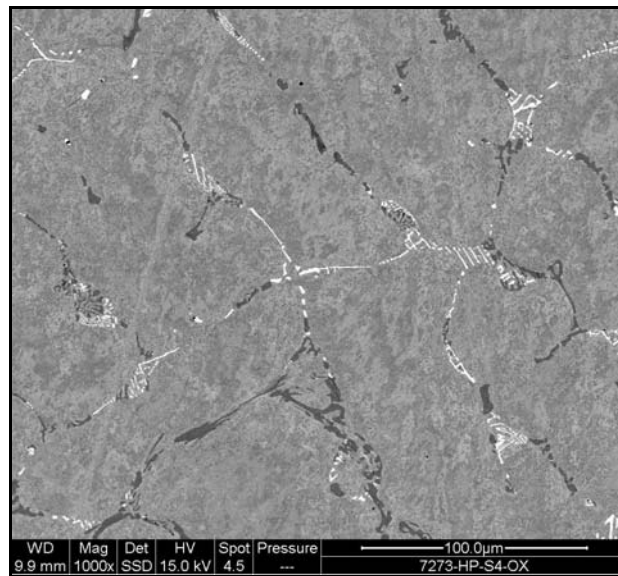
A1			A2			A3		
Element	Weight%	Atomic%	Element	Weight%	Atomic%	Element	Weight%	Atomic%
C K	9.39	29.63	C K	11.50	47.19	C K	1.55	6.48
O K	2.95	6.98	O K	1.48	4.56	O K	1.50	4.71
Cr K	77.86	56.77	Cr K	2.39	2.27	Si K	1.80	3.22
Fe K	8.43	5.72	Mn K	0.50	0.45	Cr K	22.82	22.06
Ni K	1.38	0.89	Fe K	1.29	1.13	Mn K	0.86	0.79
			Ni K	1.56	1.31	Fe K	35.25	31.73
			Nb L	81.28	43.10	Ni K	36.21	31.00
Totals	100.00		Totals	100.00		Totals	100.00	

3.5 HP after 500h at 750°C



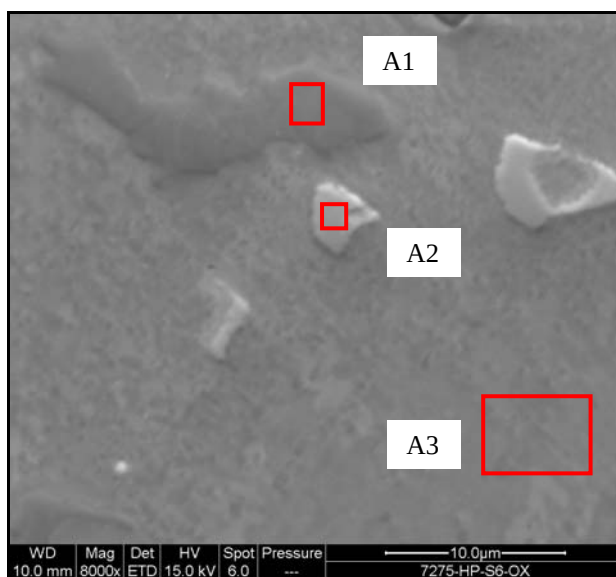
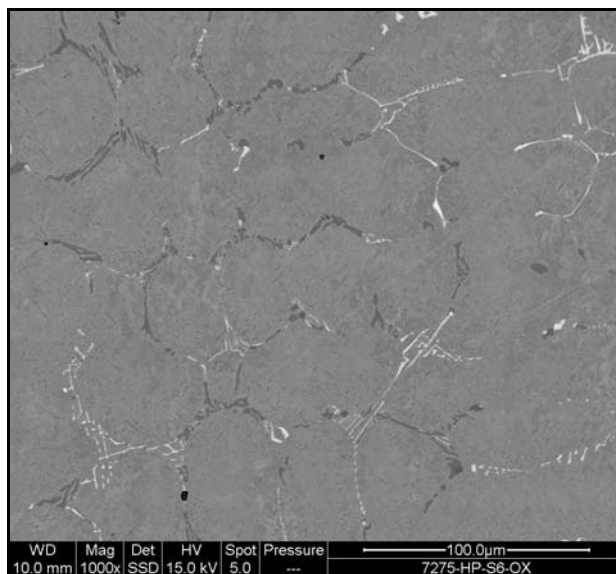
A1			A2			A3		
Element	Weight%	Atomic%	Element	Weight%	Atomic%	Element	Weight%	Atomic%
C K	9.08	36.91	C K	6.73	22.60	C K	1.45	6.14
O K	1.10	3.34	O K	3.31	8.33	O K	1.26	3.99
Si K	2.89	5.03	Cr K	78.48	60.85	Si K	1.53	2.77
Cr K	8.08	7.59	Fe K	9.42	6.80	Cr K	22.22	21.73
Fe K	3.20	2.80	Ni K	2.06	1.42	Mn K	0.90	0.83
Ni K	14.98	12.45				Fe K	36.90	33.59
Y L	0.71	0.39				Ni K	35.74	30.95
Nb L	59.95	31.49						
Totals	100.00		Totals	100.00		Totals	100.00	

3.6 HP after 1000h at 750°C



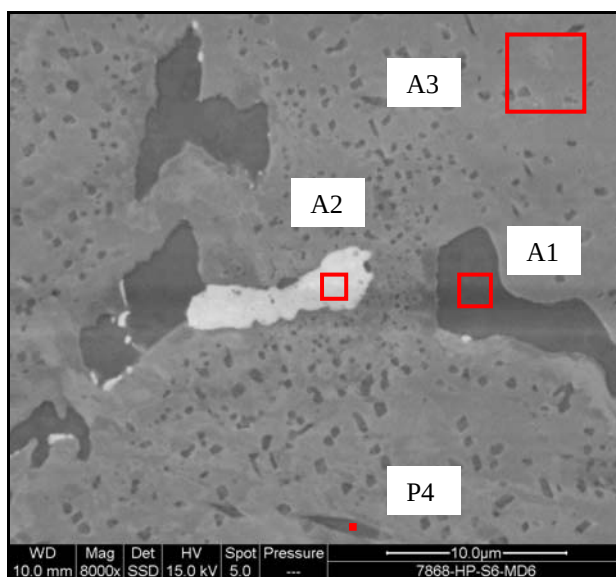
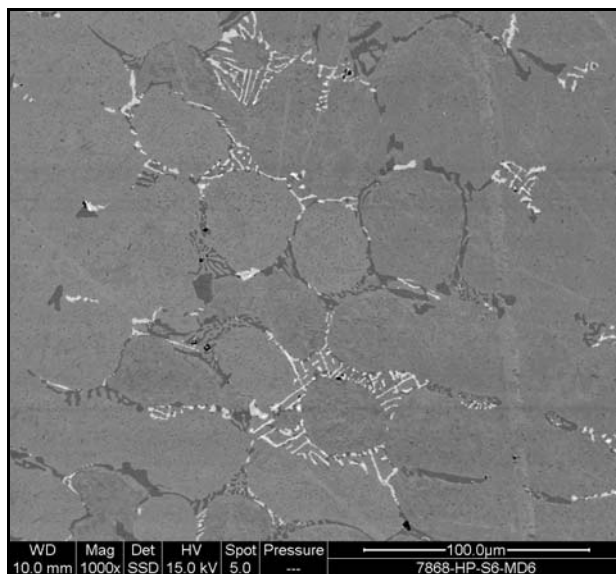
A1			A2			A3		
Element	Weight%	Atomic%	Element	Weight%	Atomic%	Element	Weight%	Atomic%
C K	7.04	23.51	C K	11.83	44.87	C K	1.96	8.04
O K	3.14	7.88	N K	2.55	8.30	O K	1.48	4.55
Cr K	77.27	59.66	O K	1.13	3.23	Si K	2.51	4.40
Mn K	0.82	0.60	Si K	0.27	0.43	Cr K	24.37	23.09
Fe K	9.46	6.80	Cr K	2.56	2.24	Mn K	1.21	1.08
Ni K	2.28	1.56	Fe K	0.93	0.76	Fe K	32.22	28.42
			Ni K	1.99	1.55	Ni K	36.25	30.41
			Nb L	78.74	38.61			
Totals	100.00		Totals	100.00		Totals	100.00	

3.7 HP after 100h at 850°C



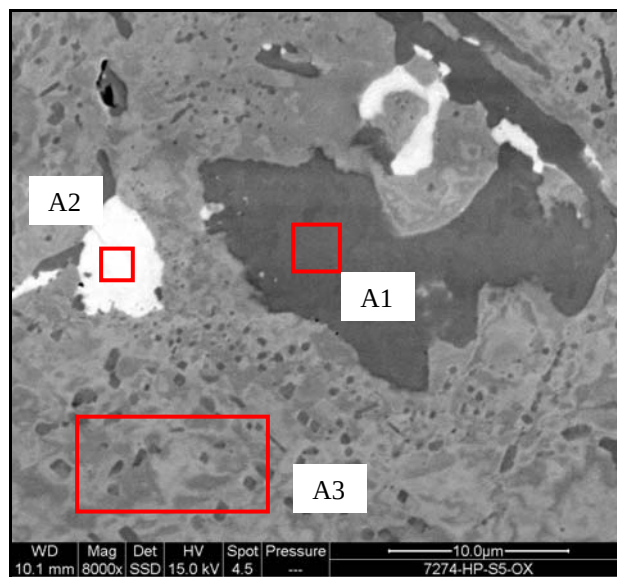
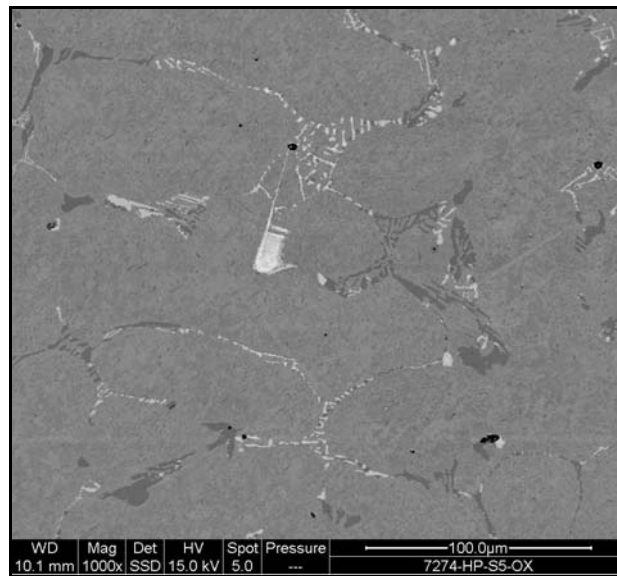
A1			A2			A3		
Element	Weight%	Atomic%	Element	Weight%	Atomic%	Element	Weight%	Atomic%
C K	6.68	22.44	C K	11.13	46.31	C K	1.31	5.51
O K	3.29	8.30	O K	1.09	3.40	O K	1.41	4.48
Cr K	79.15	61.46	Si K	0.40	0.72	Si K	1.92	3.46
Fe K	8.77	6.34	Cr K	2.70	2.60	Cr K	23.47	22.88
Ni K	2.12	1.46	Fe K	1.30	1.17	Mn K	0.61	0.56
			Ni K	3.09	2.63	Fe K	35.30	32.04
			Nb L	80.28	43.18	Ni K	35.99	31.08
Totals	100.00		Totals	100.00		Totals	100.00	

3.8 HP after 500h at 850°C



A1			A2			A3			P4		
	Wt%	At%		Wt%	At%		Wt%	At%		Wt%	At%
C K	6.31	21.47	C K	2.75	12.06	C K	1.74	7.30	C K	5.43	19.41
O K	3.21	8.21	Si K	10.43	19.57	O K	1.22	3.85	O K	2.63	7.06
Cr K	78.22	61.46	Cr K	2.65	2.69	Si K	1.69	3.03	Si K	0.84	1.28
Fe K	9.18	6.72	Fe K	5.15	4.86	Cr K	23.07	22.31	Cr K	51.52	42.52
Ni K	3.08	2.14	Ni K	48.38	43.43	Mn K	1.14	1.04	Fe K	21.12	16.23
			Nb L	30.64	17.38	Fe K	35.31	31.80	Ni K	18.46	13.49
						Ni K	35.82	30.68			
Totals	100.0		Totals	100.0		Totals	100.0		Totals	100.0	

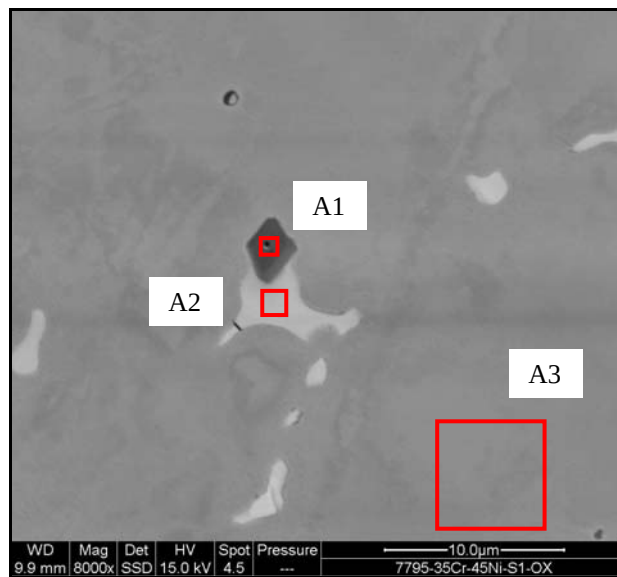
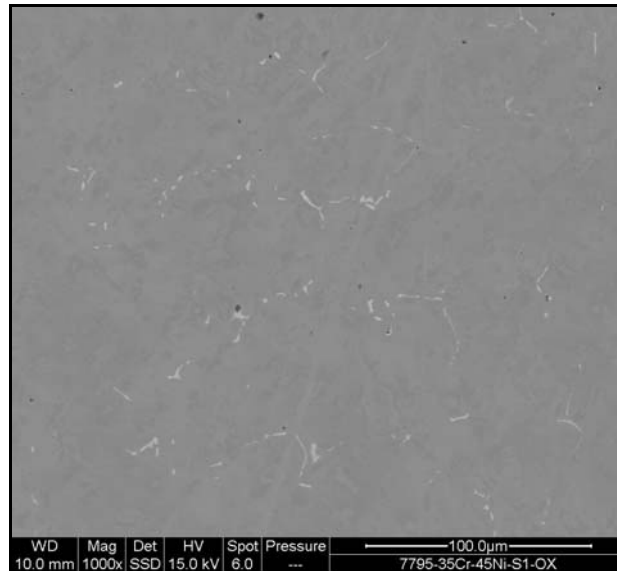
3.9 HP after 1000h at 850°C



A1			A2			A3		
Element	Weight%	Atomic%	Element	Weight%	Atomic%	Element	Weight%	Atomic%
C K	7.30	24.20	C K	6.30	26.25	C K	1.66	6.90
O K	3.22	8.00	O K	1.27	3.98	O K	1.50	4.68
Cr K	78.37	59.98	Si K	6.70	11.94	Si K	1.77	3.16
Fe K	8.33	5.94	Cr K	1.97	1.89	Cr K	24.38	23.46
Ni K	2.78	1.88	Fe K	2.90	2.60	Mn K	0.97	0.88
			Ni K	31.30	26.67	Fe K	34.47	30.88
			Nb L	49.55	26.68	Ni K	35.26	30.04
Totals	100.00		Totals	100.00		Totals	100.00	

4 Microstructure of 35Cr-45Ni

4.1 35Cr-45Ni after 100h at 650°C



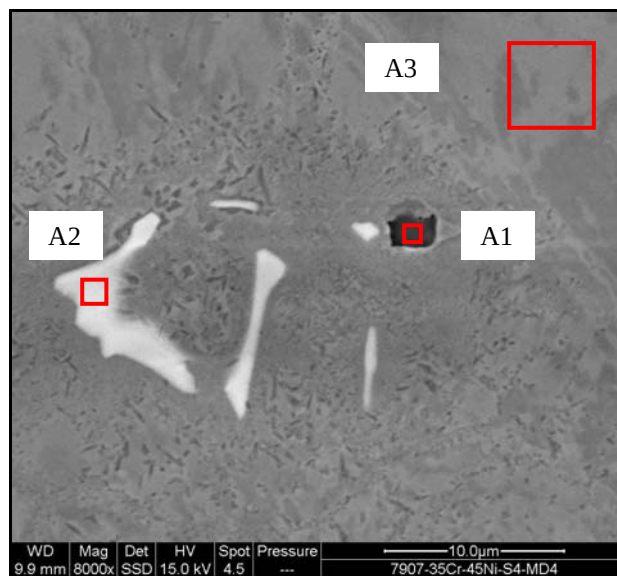
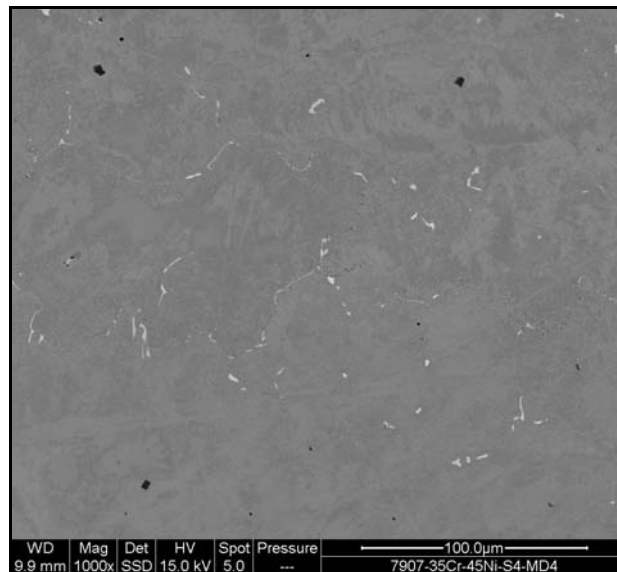
A1

A2

A3

Element	Weight%	Atomic%	Element	Weight%	Atomic%	Element	Weight%	Atomic%
C K	0.64	1.57	O K	3.65	16.34	C K	1.20	5.07
N K	19.56	41.17	Ti K	7.55	11.29	O K	1.54	4.91
O K	9.50	17.52	Cr K	4.67	6.43	Si K	1.33	2.42
Al K	0.47	0.52	Fe K	0.63	0.81	Cr K	33.40	32.72
Si K	0.15	0.16	Ni K	1.68	2.05	Mn K	1.81	1.67
Ti K	49.94	30.75	Y L	0.71	0.57	Fe K	16.93	15.44
Cr K	6.70	3.80	Nb L	81.10	62.50	Ni K	43.05	37.36
Fe K	0.59	0.31				Nb L	0.75	0.41
Ni K	1.37	0.69						
Nb L	11.09	3.52						
Totals	100.00		Totals	100.00		Totals	100.00	

4.2 35Cr-45Ni after 500h at 650°C



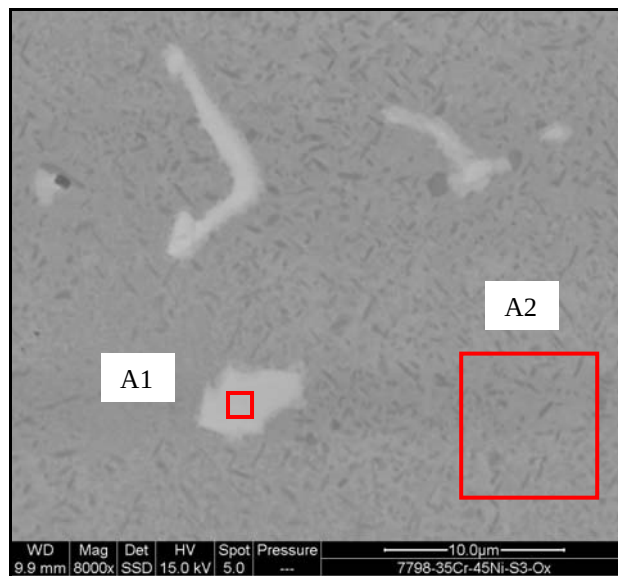
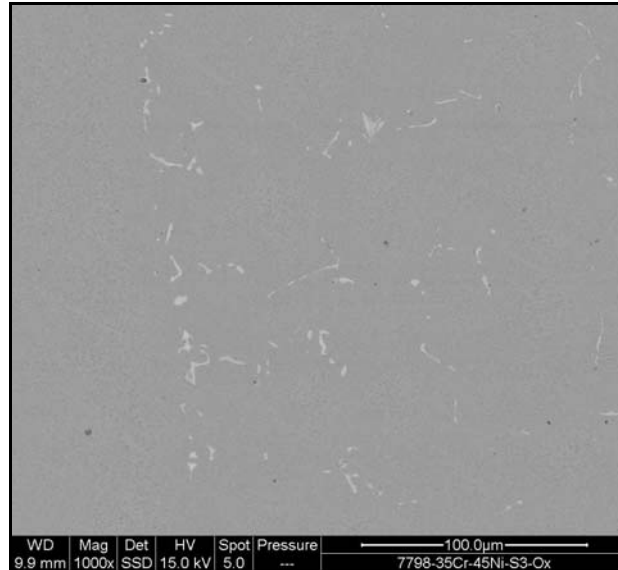
A1

A2

A3

Element	Weight%	Atomic%	Element	Weight%	Atomic%	Element	Weight%	Atomic%
C K	1.64	5.77	C K	9.64	36.84	C K	1.25	5.32
O K	2.34	6.16	N K	4.00	13.10	O K	1.49	4.77
F K	1.38	3.07	O K	1.25	3.58	Si K	0.91	1.66
Si K	0.73	1.10	Si K	0.37	0.61	Cr K	32.37	31.76
S K	22.48	29.58	Cr K	6.34	5.60	Mn K	1.02	0.95
Cr K	14.65	11.89	Fe K	1.09	0.90	Fe K	18.66	17.05
Mn K	41.28	31.70	Ni K	4.08	3.19	Ni K	44.28	38.49
Fe K	4.10	3.10	Nb L	73.22	36.18			
Ni K	8.35	6.00						
Se L	3.04	1.63						
Totals	100.00		Totals	100.00		Totals	100.00	

4.3 35Cr-45Ni after 1000h at 650°C

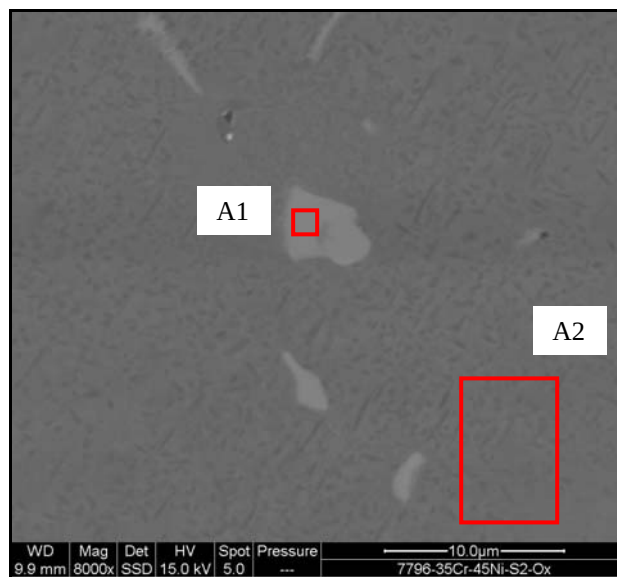
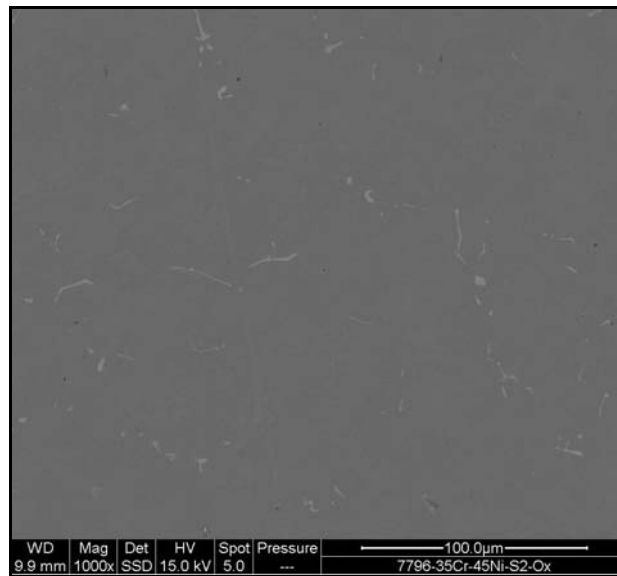


A1

A2

Element	Weight%	Atomic%	Element	Weight%	Atomic%
C K	9.36	37.91	C K	1.16	4.89
N K	3.43	11.91	O K	1.70	5.40
O K	0.95	2.89	Si K	1.31	2.36
Cr K	3.23	3.02	Cr K	33.81	33.03
Fe K	0.52	0.45	Mn K	1.54	1.43
Ni K	2.10	1.74	Fe K	16.66	15.15
Nb L	80.40	42.08	Ni K	43.26	37.43
			Nb L	0.57	0.31
Totals	100.00		Totals	100.00	

4.4 35Cr-45Ni after 100h at 750°C



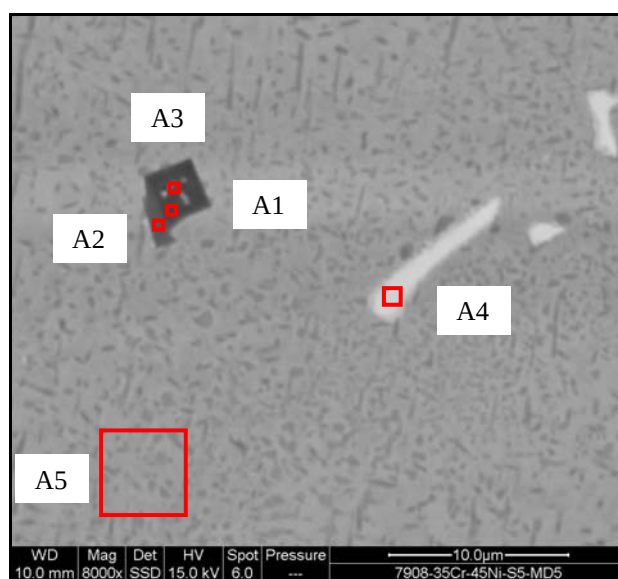
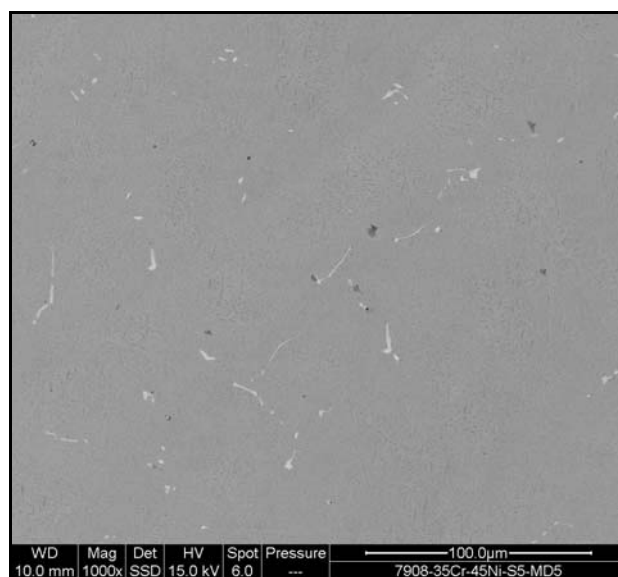
A1

Element	Weight%	Atomic%
C K	9.90	39.60
N K	2.47	8.47
O K	1.47	4.43
Cr K	4.96	4.58
Fe K	0.60	0.52
Ni K	2.32	1.90
Nb L	78.28	40.50
Totals	100.00	

A2

Element	Weight%	Atomic%
C K	1.36	5.72
O K	1.61	5.07
Si K	1.39	2.50
Cr K	33.72	32.70
Mn K	1.45	1.33
Fe K	17.33	15.64
Ni K	43.14	37.04
Totals	100.00	

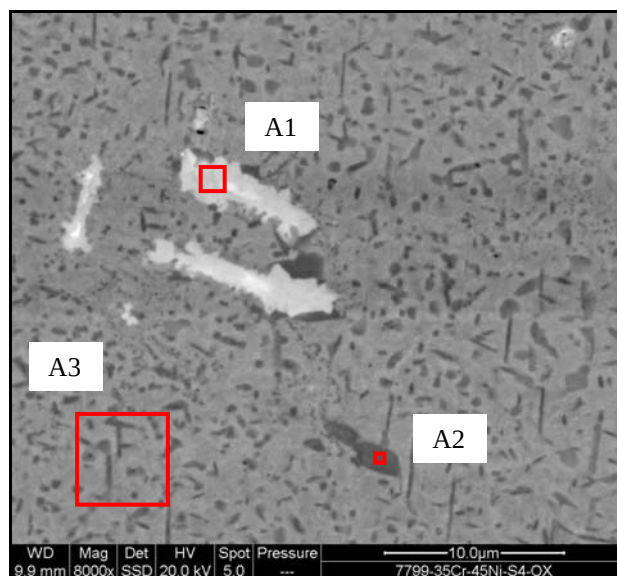
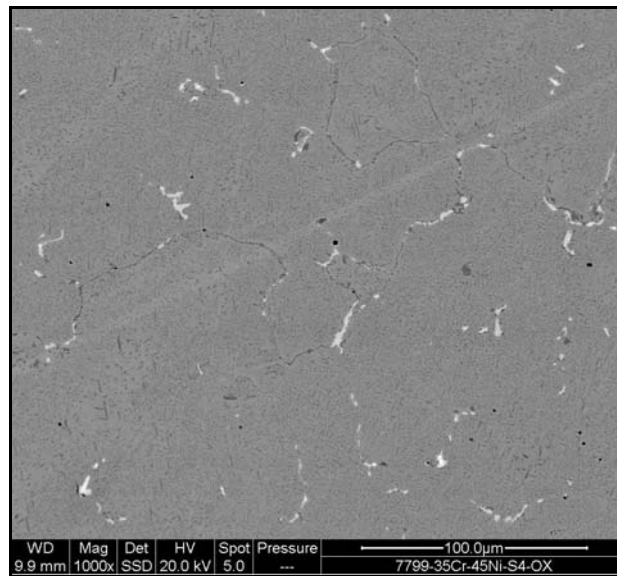
4.5 35Cr-45Ni after 500h at 750°C



A1			A2			A3		
Element	Weight%	Atomic%	Element	Weight%	Atomic%	Element	Weight%	Atomic%
N K	23.46	52.62	N K	18.68	47.85	N K	10.03	19.99
Ti K	58.12	38.12	Ti K	38.58	28.89	O K	26.71	46.61
Cr K	8.10	4.89	Cr K	12.19	8.41	Al K	0.54	0.56
Fe K	1.55	0.87	Fe K	4.12	2.64	Si K	0.60	0.59
Ni K	2.65	1.42	Ni K	8.92	5.45	Ti K	44.50	25.93
Nb L	6.11	2.07	Nb L	17.51	6.76	Cr K	6.04	3.24
						Ni K	1.65	0.79
						Nb L	3.02	0.91
						Ce L	6.91	1.38
Totals	100.00					Totals	100.00	

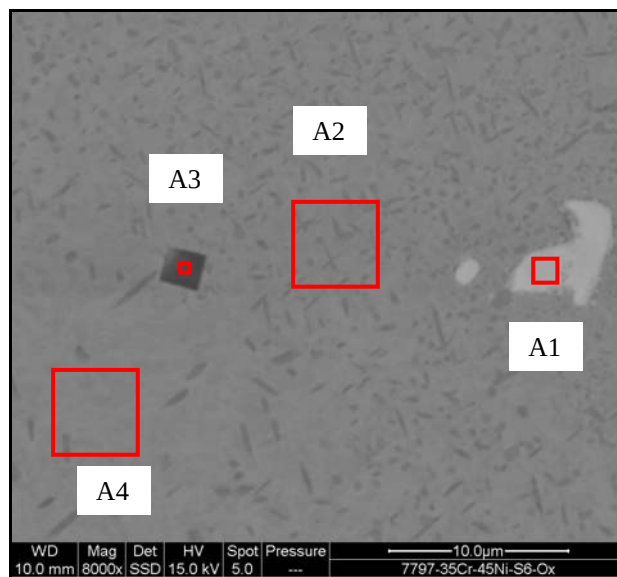
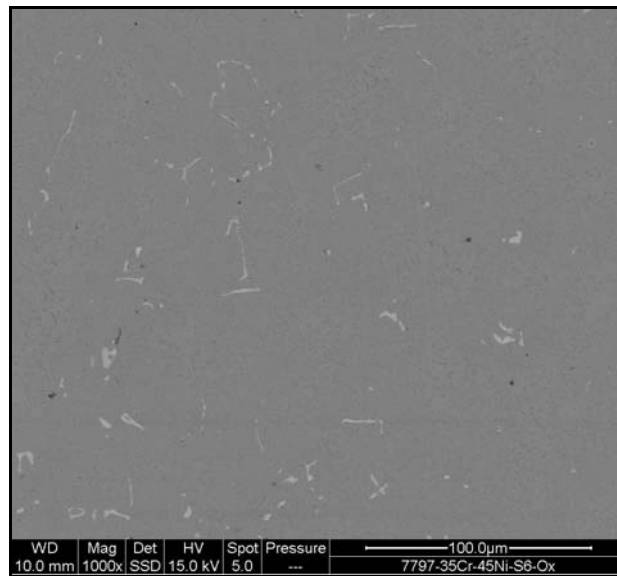
A4			A5		
Element	Weight%	Atomic%	Element	Weight%	Atomic%
C K	10.72	46.45	O K	1.76	5.77
Si K	0.48	0.89	Si K	1.63	3.05
Cr K	3.87	3.87	Cr K	35.17	35.47
Ni K	3.78	3.35	Mn K	1.56	1.49
Nb L	81.15	45.44	Fe K	16.22	15.23
			Ni K	43.67	39.00
Totals	100.00		Totals	100.00	

4.6 35Cr-45Ni after 1000h at 750°C



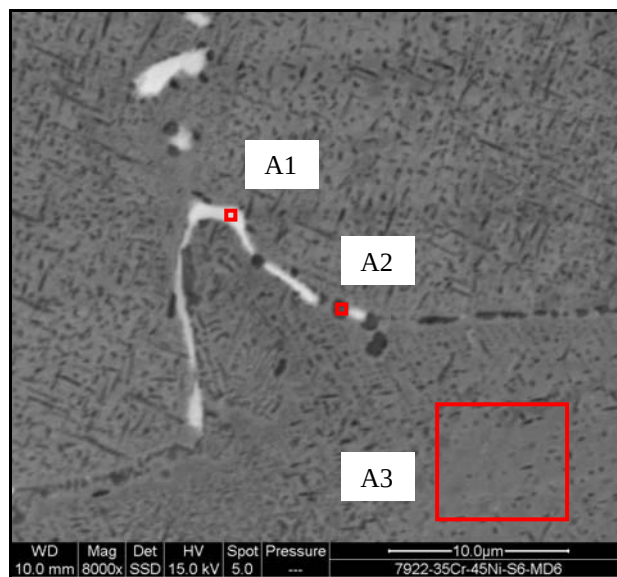
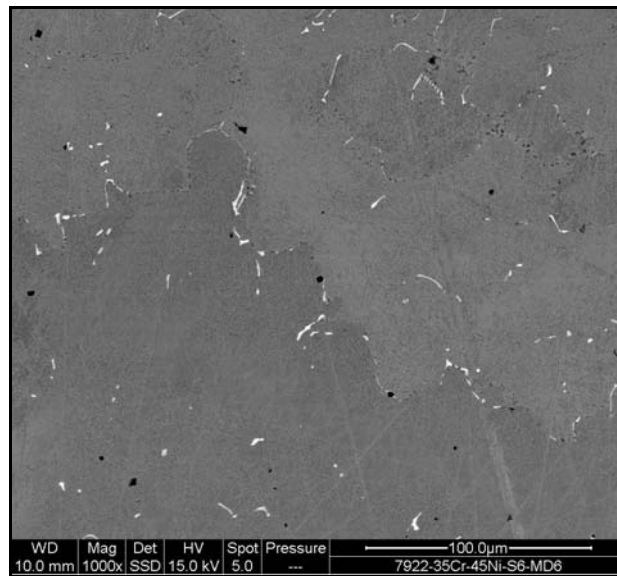
A1			A2			A3		
Element	Weight%	Atomic%	Element	Weight%	Atomic%	Element	Weight%	Atomic%
C K	4.23	18.34	C K	1.59	6.23	C K	1.71	7.11
O K	1.84	5.98	O K	2.89	8.48	O K	1.57	4.90
Si K	5.81	10.76	Si K	0.60	1.00	Si K	1.60	2.85
Ti K	0.25	0.27	Cr K	79.22	71.43	Cr K	33.98	32.60
Cr K	10.84	10.86	Mn K	0.69	0.59	Mn K	1.69	1.54
Fe K	1.68	1.56	Fe K	7.22	6.06	Fe K	16.44	14.69
Ni K	30.66	27.18	Ni K	7.79	6.22	Ni K	42.30	35.94
Nb L	44.69	25.04				Nb L	0.70	0.38
Totals	100.00		Totals	100.00		Totals	100.00	

4.7 35Cr-45Ni after 100h at 850°C



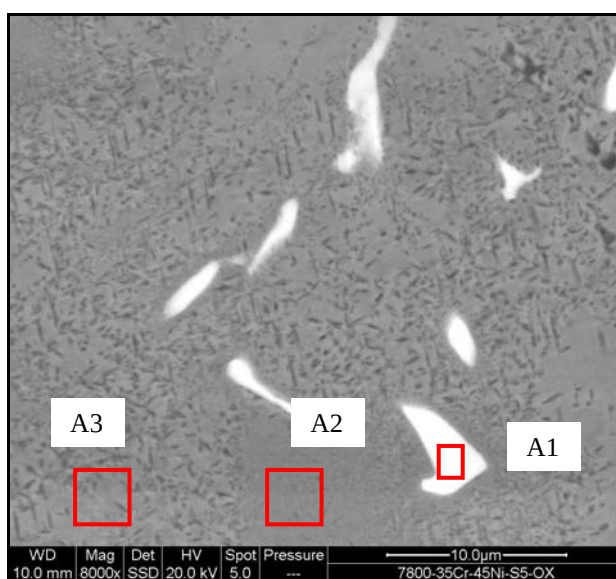
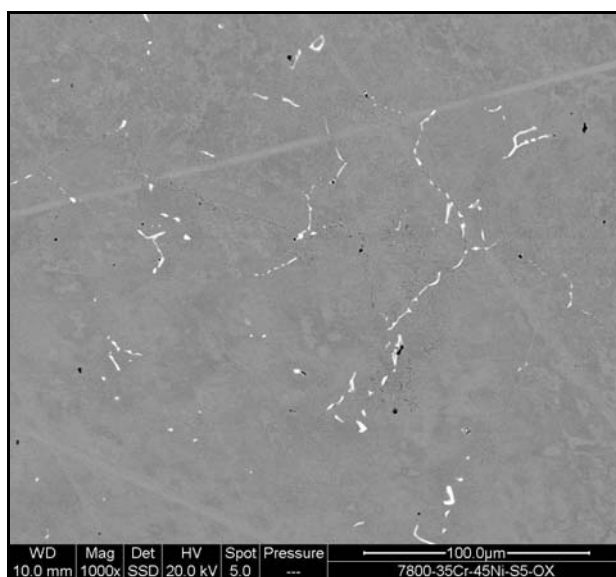
A1			A2			A3			A4		
	Wt%	At%		Wt%	At%		Wt%	At%		Wt%	At%
C K	8.42	38.28	C K	0.94	3.99	C K	0.92	2.41	C K	1.06	4.54
O K	1.75	5.97	O K	1.75	5.58	N K	22.16	50.04	O K	1.36	4.38
Ti K	0.51	0.58	Si K	1.31	2.39	Si K	0.41	0.47	Si K	0.95	1.74
Cr K	3.74	3.93	Cr K	32.83	32.31	Ti K	47.29	31.22	Cr K	29.50	29.30
Fe K	0.64	0.63	Mn K	1.67	1.55	Cr K	15.00	9.13	Mn K	1.25	1.18
Ni K	2.06	1.92	Fe K	17.12	15.69	Fe K	2.85	1.61	Fe K	19.67	18.19
Nb L	82.86	48.68	Ni K	43.79	38.17	Ni K	6.30	3.39	Ni K	46.22	40.66
			Nb L	0.60	0.33	Nb L	5.07	1.72			
Totals	100.0		Totals	100.0		Totals	100.0		Totals	100.0	

4.8 35Cr-45Ni after 500h at 850°C



A1			A2			A3		
Element	Weight%	Atomic%	Element	Weight%	Atomic%	Element	Weight%	Atomic%
C K	8.46	35.08	C K	1.41	5.59	C K	1.12	4.76
O K	2.50	7.80	O K	2.83	8.45	O K	1.64	5.23
Si K	1.00	1.78	Si K	0.32	0.54	Si K	1.03	1.87
Ti K	1.04	1.09	Cr K	69.80	64.11	Cr K	31.27	30.71
Cr K	8.16	7.82	Mn K	1.15	1.00	Mn K	1.37	1.27
Fe K	2.34	2.09	Fe K	9.24	7.90	Fe K	18.80	17.20
Ni K	10.59	8.99	Ni K	15.25	12.40	Ni K	44.77	38.95
Nb L	65.90	35.35						
Totals	100.00		Totals	100.00		Totals	100.00	

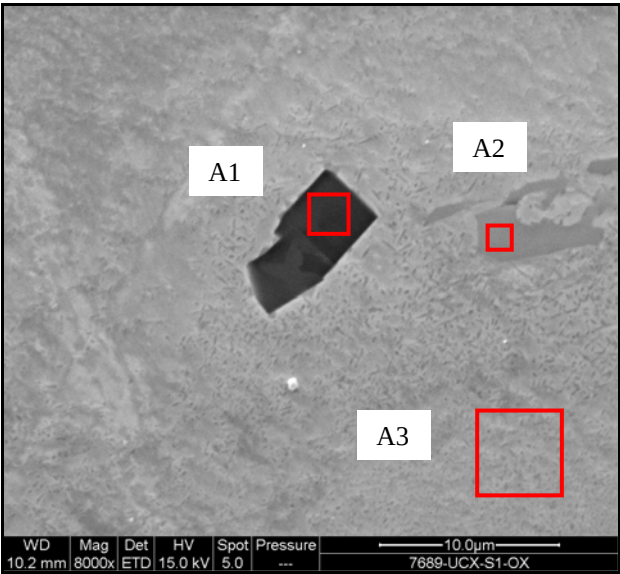
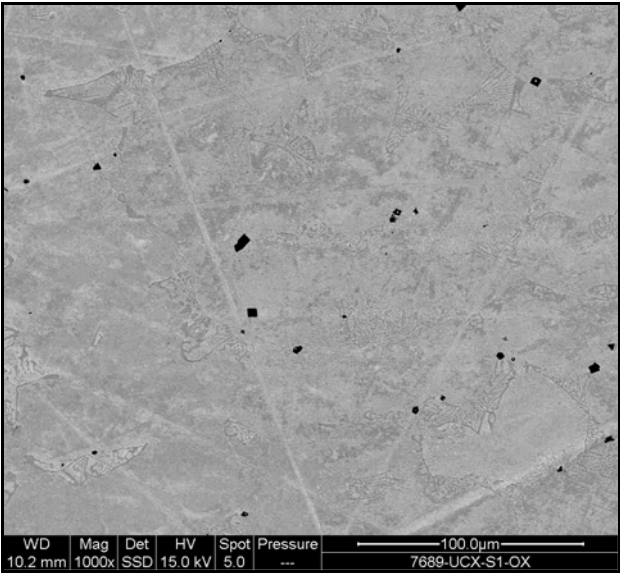
4.9 35Cr-45Ni after 1000h at 850°C



A1			A2			A3		
Element	Weight%	Atomic%	Element	Weight%	Atomic%	Element	Weight%	Atomic%
C K	10.21	39.10	C K	2.34	9.35	C K	1.34	5.62
N K	3.58	11.75	O K	1.94	5.82	O K	1.65	5.16
O K	1.45	4.18	Si K	2.24	3.81	Si K	1.91	3.42
Cr K	4.61	4.07	Cr K	38.61	35.58	Cr K	35.30	34.09
Mn K	0.24	0.20	Mn K	1.81	1.58	Mn K	1.92	1.75
Fe K	0.89	0.73	Fe K	13.41	11.50	Fe K	15.39	13.84
Ni K	2.96	2.32	Ni K	39.64	32.35	Ni K	41.80	35.75
Nb L	76.06	37.65				Nb L	0.70	0.38
Totals	100.00		Totals	100.00		Totals	100.00	

5 **Microstructure of UCX**

5.1 **UCX after 100h at 650°C**



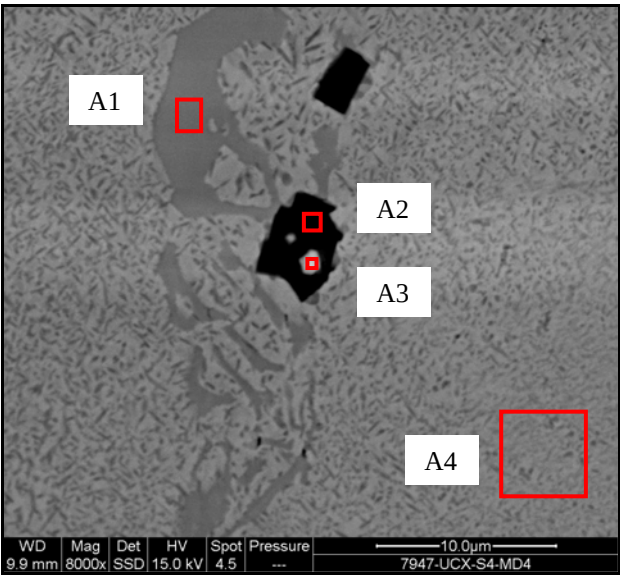
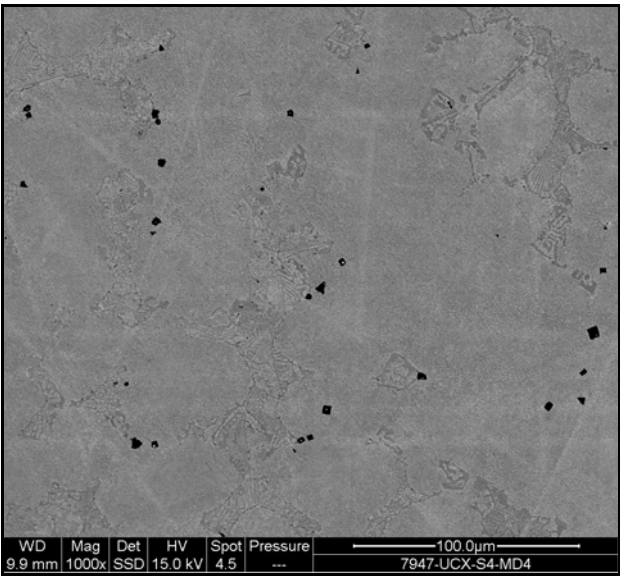
A1

A2

A3

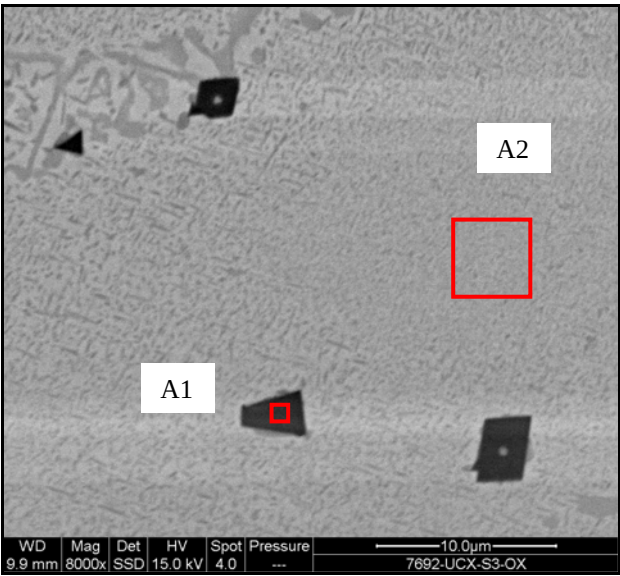
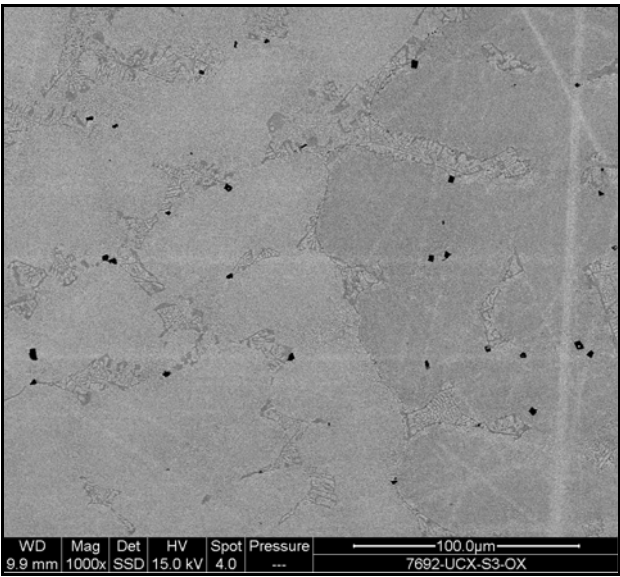
Element	Weight%	Atomic%	Element	Weight%	Atomic%	Element	Weight%	Atomic%
N K	24.36	52.79	C K	6.61	22.94	C K	1.03	4.34
Ti K	67.93	43.05	O K	2.93	7.65	O K	1.79	5.69
Cr K	5.47	3.20	Cr K	77.70	62.33	Si K	2.09	3.78
Ni K	1.23	0.63	Fe K	1.60	1.20	Cr K	38.05	37.19
Nb L	1.01	0.33	Ni K	6.93	4.92	Mn K	0.87	0.81
			W M	4.22	0.96	Fe K	5.17	4.71
						Ni K	49.87	43.17
						W M	1.12	0.31
Totals	100.00		Totals	100.00		Totals	100.00	

5.2 UCX after 500h at 650°C



A1			A2			A3			A4		
	Wt%	At%		Wt%	At%		Wt%	At%		Wt%	At%
C K	6.13	21.51	C K	0.78	1.99	N K	13.84	32.19	C K	1.12	4.77
O K	3.13	8.24	N K	22.43	49.30	O K	10.63	21.65	O K	1.76	5.61
Cr K	78.49	63.65	Ti K	68.93	44.29	Si K	1.08	1.26	Si K	1.54	2.78
Fe K	1.47	1.11	Cr K	5.91	3.50	Ti K	39.83	27.09	Cr K	37.54	36.75
Ni K	6.16	4.43	Ni K	1.44	0.75	Cr K	10.54	6.61	Mn K	0.82	0.76
W M	4.62	1.06	Nb L	0.52	0.17	Fe K	1.29	0.75	Fe K	5.51	5.02
						Ni K	11.68	6.48	Ni K	50.81	44.06
						Zr L	11.12	3.97	W M	0.90	0.25
Totals	100.0		Totals	100.0		Totals	100.0		Totals	100.0	

5.3 UCX after 1000h at 650°C



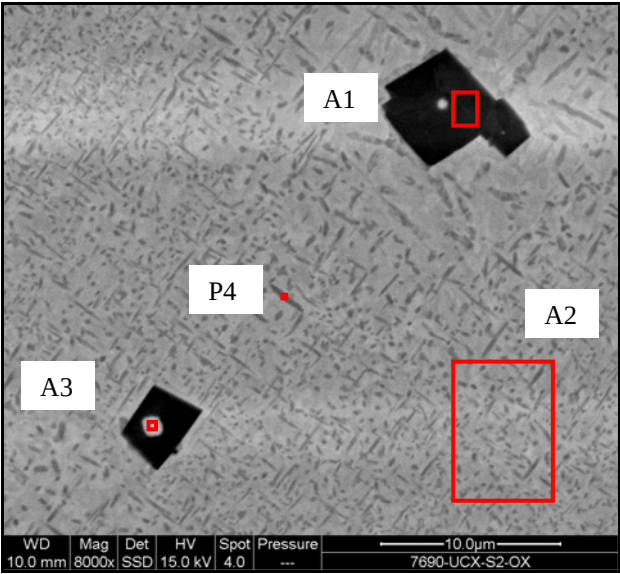
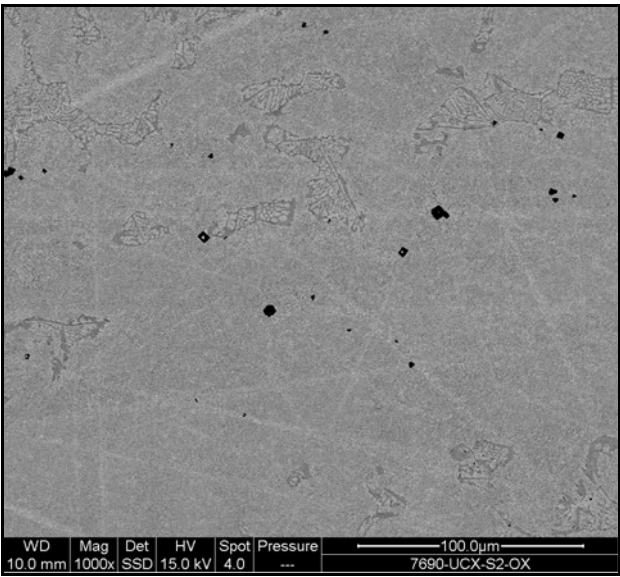
A1

Element	Weight%	Atomic%
N K	18.34	44.70
Si K	0.64	0.78
Ti K	38.87	27.71
Cr K	30.07	19.74
Fe K	1.80	1.10
Ni K	10.28	5.98
Totals	100.00	

A2

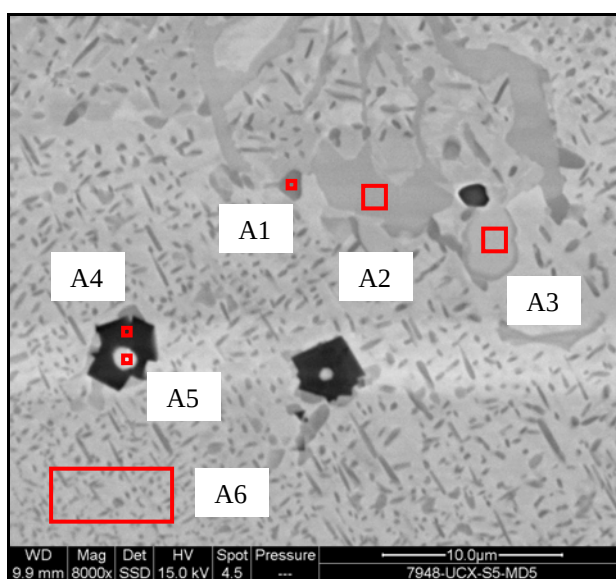
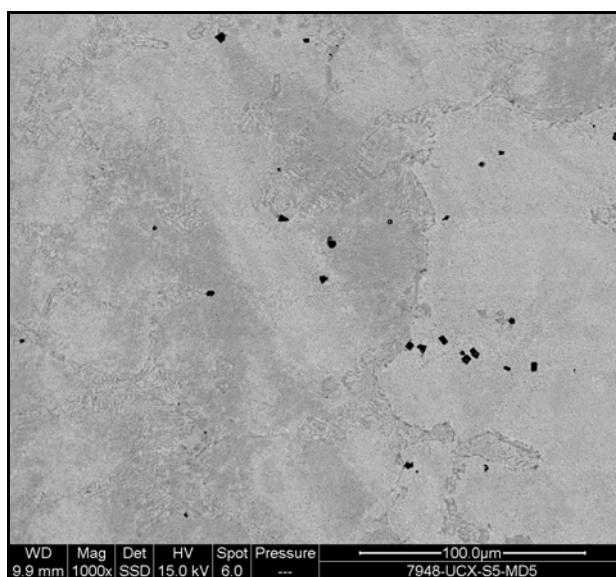
Element	Weight%	Atomic%
C K	1.19	5.00
O K	1.92	6.07
Si K	1.94	3.49
Cr K	38.06	36.95
Mn K	0.88	0.81
Fe K	5.48	4.95
Ni K	49.31	42.40
W M	1.21	0.33
Totals	100.00	

5.4 UCX after 100h at 750°C



A1			A2			A3			P4		
	Wt%	At%		Wt%	At%		Wt%	At%		Wt%	At%
N K	24.37	52.69	C K	1.35	5.63	N K	9.19	21.12	C K	0.85	3.48
Si K	0.19	0.21	O K	1.63	5.11	O K	25.49	51.28	O K	2.67	8.17
Ti K	68.55	43.35	Si K	2.67	4.77	Ti K	12.01	8.07	Si K	1.06	1.85
Cr K	4.62	2.69	Cr K	37.88	36.57	Cr K	1.54	0.95	Cr K	71.13	66.99
Ni K	1.70	0.88	Mn K	0.74	0.68	Ni K	1.53	0.84	Fe K	2.72	2.39
Nb L	0.57	0.19	Fe K	5.40	4.85	Zr L	50.25	17.73	Ni K	20.03	16.71
			Ni K	49.23	42.09				W M	1.54	0.41
			W M	1.10	0.30						
Totals	100.0		Totals	100.0		Totals	100.0		Totals	100.0	

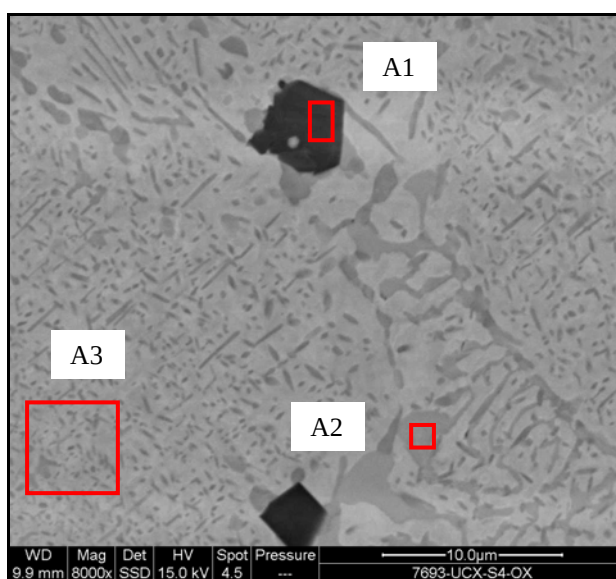
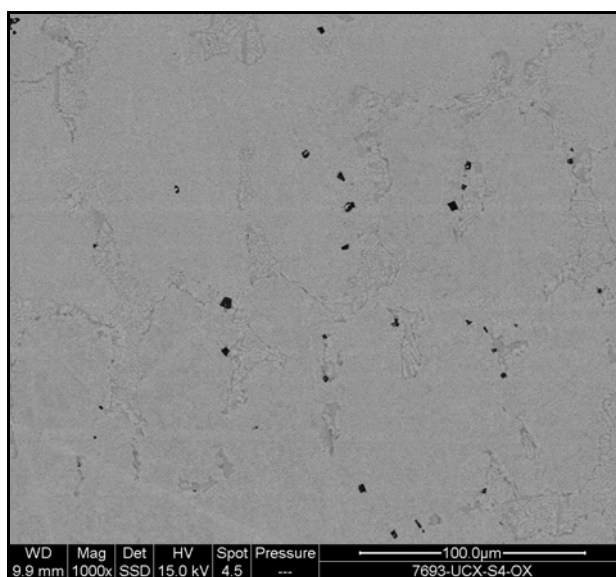
5.5 UCX after 500h at 750°C



A1			A2			A3		
Element	Weight%	Atomic%	Element	Weight%	Atomic%	Element	Weight%	Atomic%
C K	1.48	5.69	C K	6.52	22.69	C K	3.56	13.44
O K	3.75	10.81	O K	3.16	8.26	O K	1.74	4.94
Si K	0.59	0.97	Cr K	78.02	62.72	Si K	8.24	13.31
Cr K	88.22	78.32	Fe K	1.20	0.90	Ti K	0.43	0.40
Fe K	1.31	1.08	Ni K	6.03	4.29	Cr K	42.54	37.10
Ni K	3.67	2.89	W M	5.07	1.15	Fe K	0.60	0.49
W M	0.99	0.25				Ni K	35.20	27.19
						Nb L	5.13	2.50
						W M	2.57	0.63
Totals	100.00		Totals	100.00		Totals	100.00	

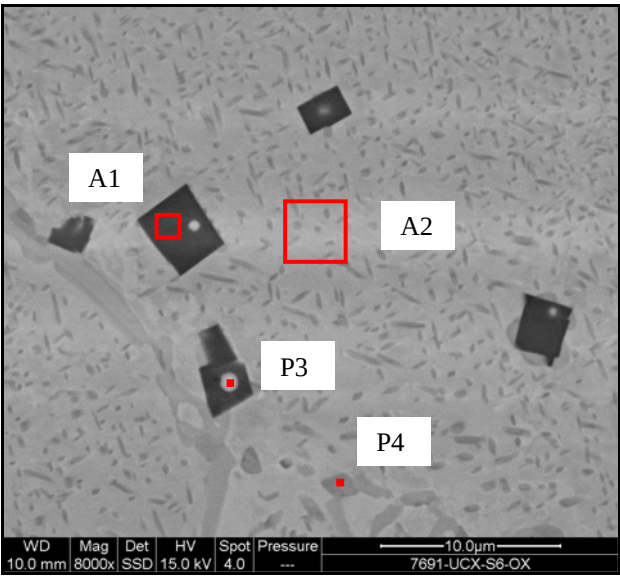
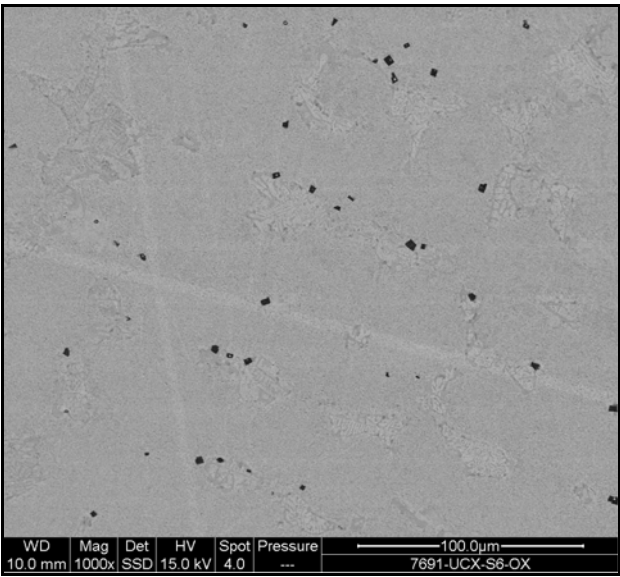
A4			A5			A6		
Element	Weight%	Atomic%	Element	Weight%	Atomic%	Element	Weight%	Atomic%
C K	1.08	2.75	N K	14.45	30.34	C K	1.06	4.50
N K	23.05	50.34	O K	21.40	39.33	O K	1.83	5.81
Ti K	61.81	39.48	Mg K	0.17	0.21	Si K	1.93	3.50
Cr K	7.34	4.32	Al K	0.68	0.74	Cr K	37.62	36.81
Fe K	0.56	0.31	Ti K	28.71	17.62	Mn K	0.83	0.76
Ni K	4.03	2.10	Cr K	3.15	1.78	Fe K	5.52	5.03
Zr L	1.16	0.39	Ni K	1.80	0.90	Ni K	49.89	43.23
Nb L	0.99	0.33	Zr L	25.77	8.31	W M	1.31	0.36
			Ce L	3.34	0.70			
			W M	0.53	0.09			
Totals	100.00		Totals	100.00		Totals	100.00	

5.6 UCX after 1000h at 750°C



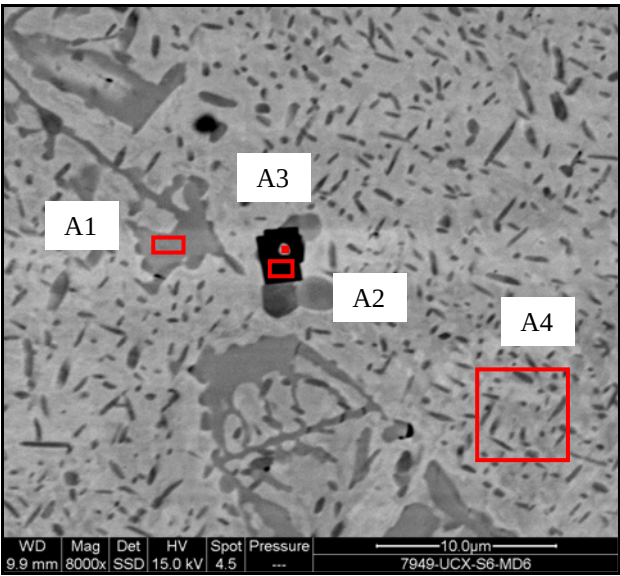
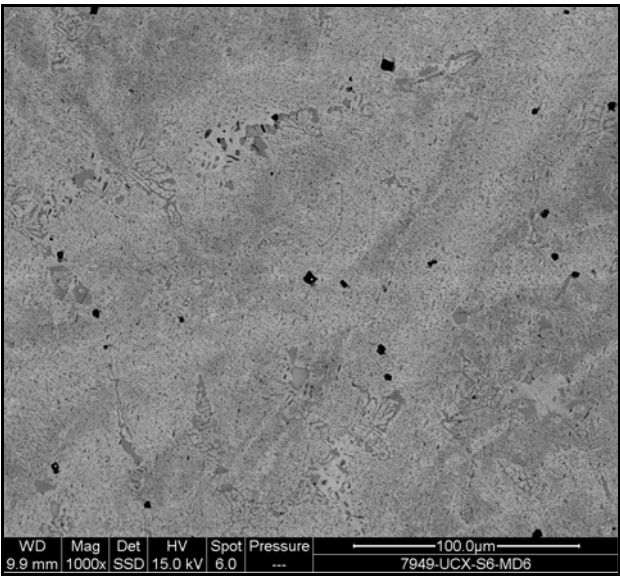
A1			A2			A3		
Element	Weight%	Atomic%	Element	Weight%	Atomic%	Element	Weight%	Atomic%
C K	0.62	1.58	C K	6.61	22.97	C K	1.05	4.46
N K	22.91	50.22	O K	3.00	7.82	O K	1.68	5.35
Ti K	67.25	43.10	Si K	0.74	1.10	Si K	1.91	3.47
Cr K	6.91	4.08	Cr K	62.96	50.52	Cr K	38.01	37.24
Ni K	1.32	0.69	Mn K	0.63	0.48	Mn K	0.61	0.56
Nb L	1.00	0.33	Fe K	2.73	2.04	Fe K	5.44	4.96
			Ni K	20.22	14.37	Ni K	50.39	43.72
			W M	3.12	0.71	W M	0.91	0.25
Totals	100.00		Totals	100.00		Totals	100.00	

5.7 UCX after 100h at 850°C



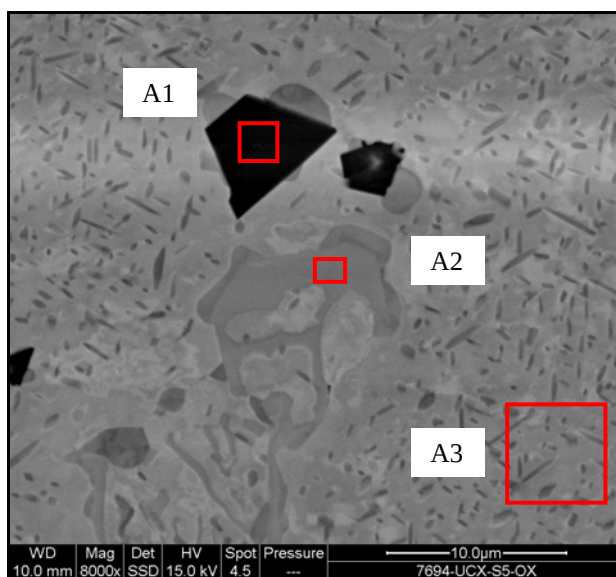
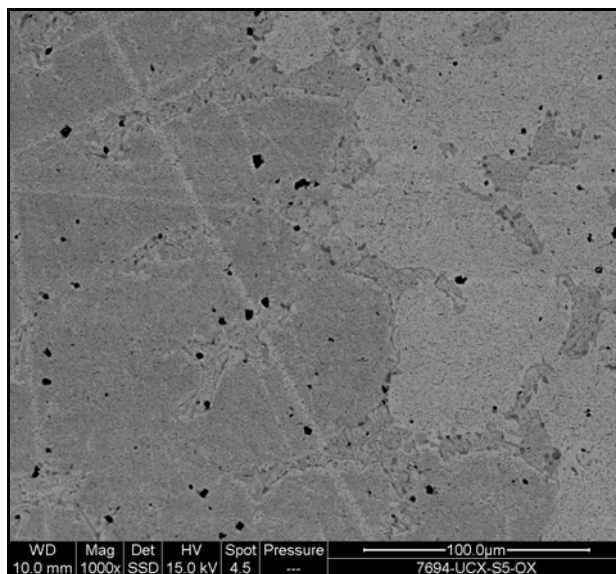
A1			A2			P3			P4		
	Wt%	At%		Wt%	At%		Wt%	At%		Wt%	At%
N K	23.23	51.09	C K	1.25	5.29	N K	14.50	29.95	C K	1.09	4.28
Ti K	70.02	45.03	O K	1.68	5.35	O K	23.01	41.61	O K	3.25	9.58
Cr K	5.04	2.98	Si K	1.87	3.39	Ti K	25.09	15.16	Si K	0.70	1.18
Ni K	1.71	0.90	Cr K	35.04	34.33	Cr K	4.15	2.31	Cr K	88.86	80.63
			Mn K	0.96	0.89	Fe K	0.43	0.22	Fe K	1.70	1.43
			Fe K	5.53	5.04	Ni K	2.58	1.27	Ni K	3.22	2.59
			Ni K	52.17	45.28	Zr L	29.56	9.38	W M	1.18	0.30
			W M	1.51	0.42	W M	0.68	0.11			
Totals	100.0		Totals	100.0		Totals	100.0		Totals	100.0	

5.8 UCX after 500h at 850°C



A1			A2			A3			A4		
	Wt%	At%		Wt%	At%		Wt%	At%		Wt%	At%
C K	5.83	20.54	C K	0.70	1.83	N K	19.72	41.53	C K	1.09	4.60
O K	3.39	8.96	N K	21.98	49.03	O K	9.29	17.13	O K	1.81	5.74
Cr K	77.69	63.25	Ti K	66.95	43.67	Al K	0.18	0.20	Si K	2.03	3.66
Mn K	0.64	0.49	Cr K	6.31	3.79	Si K	0.16	0.17	Cr K	38.56	37.56
Fe K	1.50	1.14	Ni K	2.00	1.07	Ti K	56.39	34.72	Mn K	0.79	0.72
Ni K	6.31	4.55	Zr L	1.52	0.52	Cr K	5.69	3.23	Fe K	5.17	4.69
W M	4.65	1.07	W M	0.53	0.09	Ni K	1.85	0.93	Ni K	49.54	42.74
						Zr L	6.25	2.02	W M	1.02	0.28
						W M	0.47	0.08			
Totals	100.0		Totals	100.0		Totals	100.0		Totals	100.0	

5.9 UCX after 1000h at 850°C



A1			A2			A3		
Element	Weight%	Atomic%	Element	Weight%	Atomic%	Element	Weight%	Atomic%
N K	23.59	51.54	C K	5.97	21.04	C K	1.20	5.06
Ti K	70.62	45.13	O K	2.73	7.22	O K	1.72	5.43
Cr K	4.57	2.69	Si K	1.66	2.51	Si K	2.07	3.72
Ni K	1.23	0.64	Cr K	70.97	57.75	Cr K	38.70	37.66
			Fe K	1.34	1.01	Mn K	0.73	0.67
			Ni K	13.22	9.53	Fe K	5.30	4.80
			W M	4.11	0.94	Ni K	49.12	42.33
						W M	1.16	0.32
Totals	100.00		Totals	100.00		Totals	100.00	