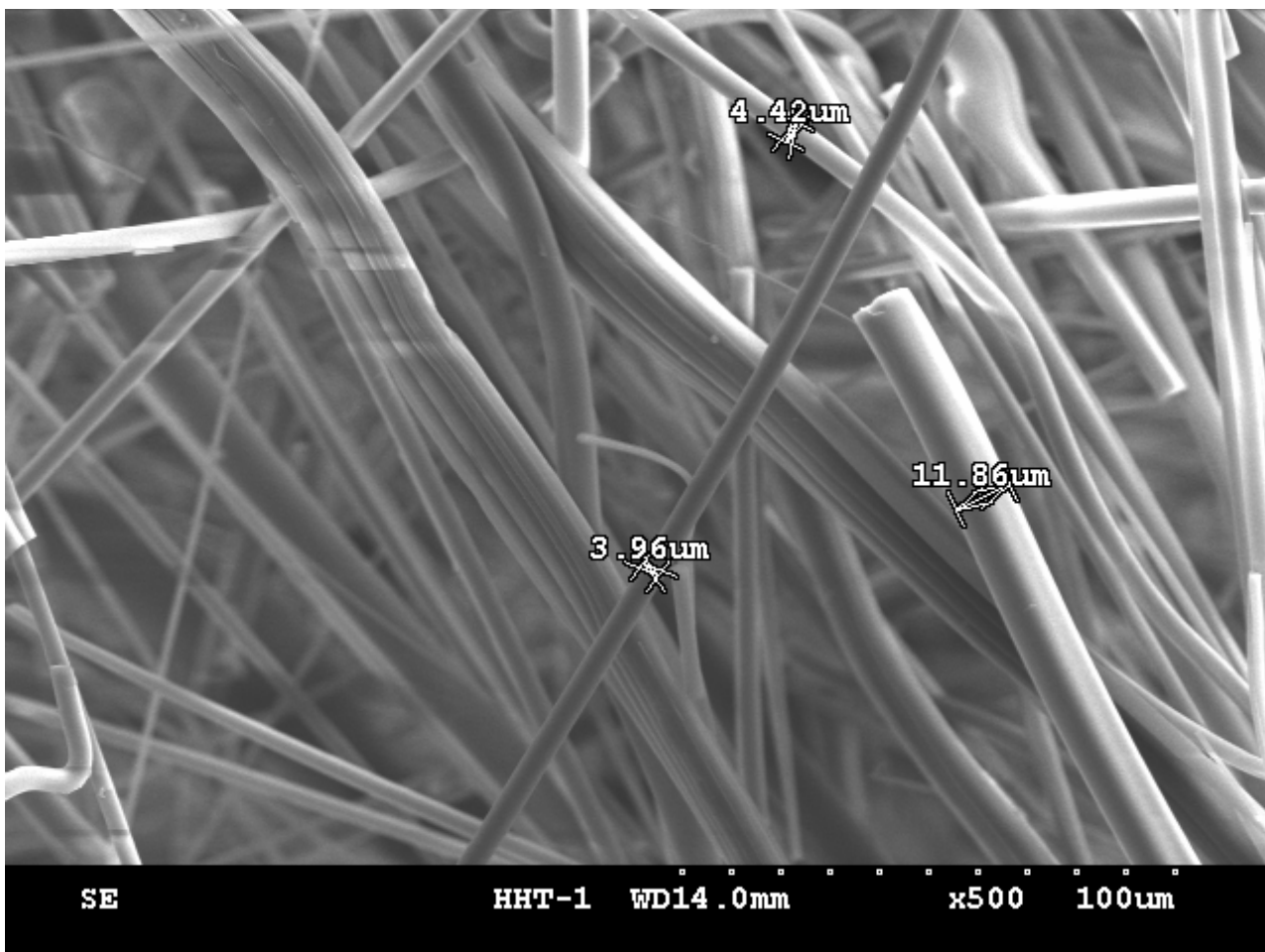
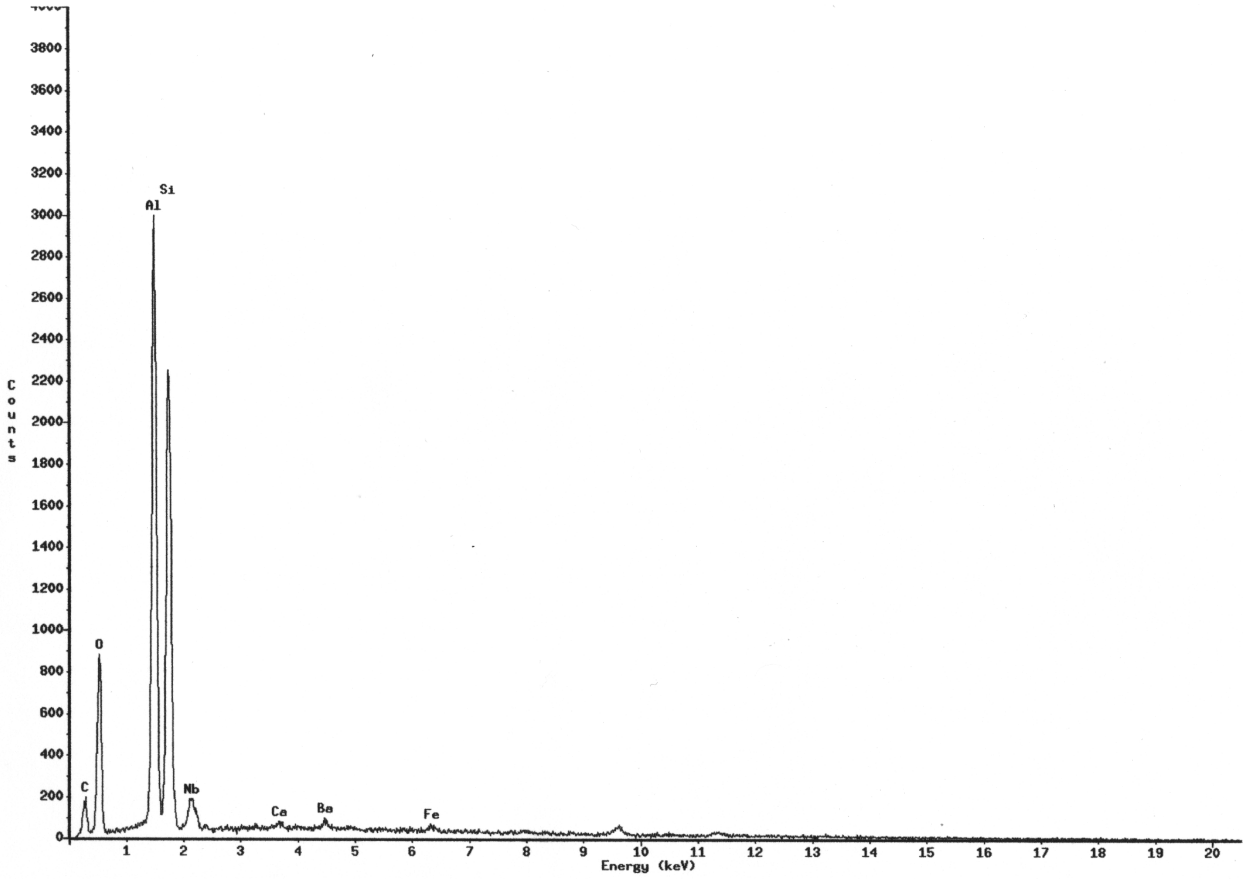


## 高溫絕熱王材質報告

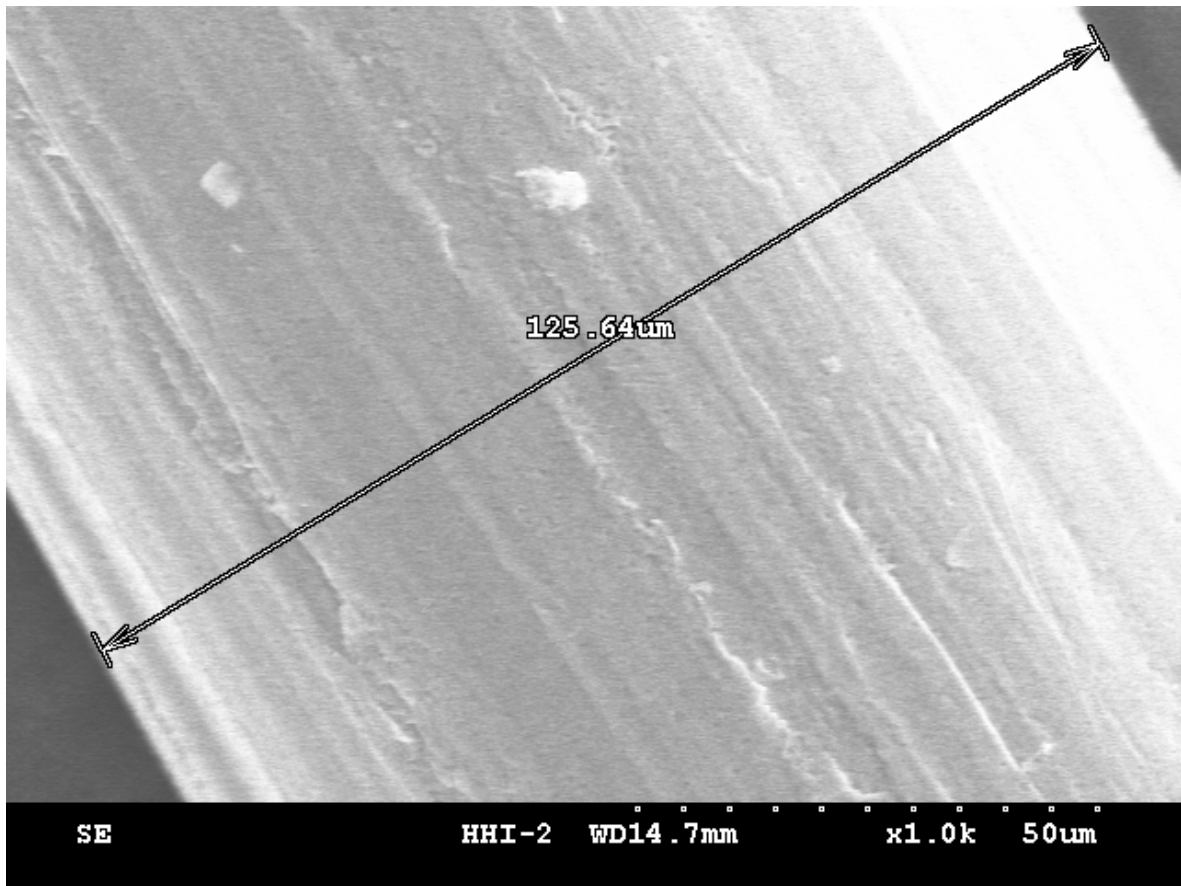
高溫絕熱王內含兩種材質，一種為陶瓷纖維，另一個為合金鋼絲，以下就兩種材質作材質分析，圖一係使用 HITACHI S-3500N 掃描式電子顯微鏡拍攝高溫絕熱王陶瓷纖維部分，可知本材質係由兩種以上纖維組成，兩種纖維的粗細約在 11.86um 與 3.96um 之間，主成分是  $\text{Al}_2\text{O}_3$  與  $\text{SiO}_2$  其他的雜項元素係陶瓷纖維粘結劑，其成分可由圖二之 EDS 圖譜得知，其材質主要分別為 C(6),O(8),Al(13),Si(14),Nb(41)，其原始量測資料數據如附錄一 而其中所添加之合金鋼絲其 1000 倍之電子顯微鏡照片如圖三，其材質圖譜如圖四，其主成分為 Fe(26),C(6),Mn(25),Cr(24) 的合金，其原始量測資料數據如附錄二



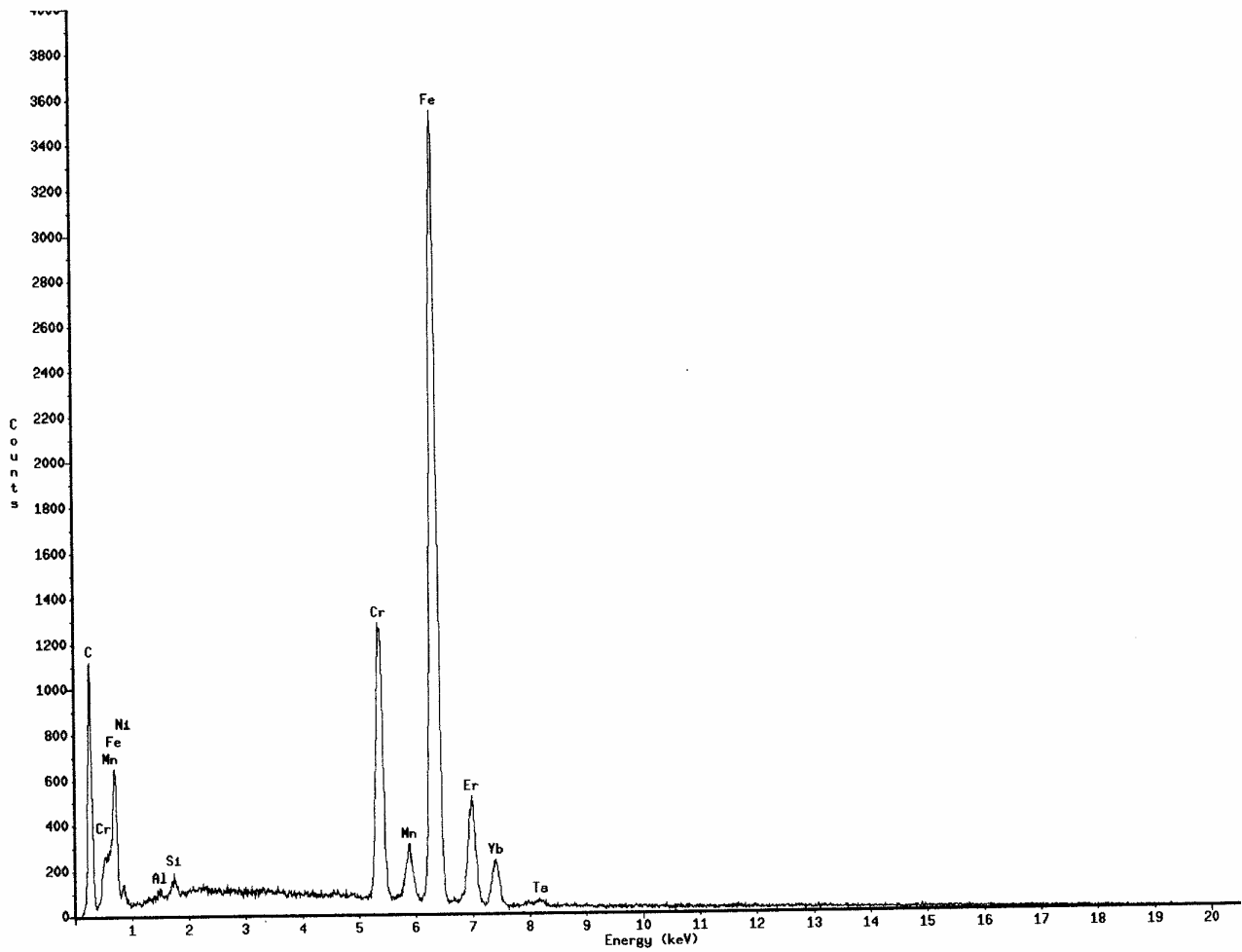
圖一 高溫絕熱王陶瓷纖維 電子顯微鏡(SEM) 500 倍放大圖



圖二 高溫絕熱王陶瓷纖維 材質分析圖(EDS)



圖三 高溫絕熱王內之合金鋼絲電子顯微鏡放大圖 1000 倍



圖四 高溫絕熱王內之合金鋼絲材質分析(EDS)



附錄一 高溫絕熱王陶瓷纖維之原始量測資料數據

Wed Nov 16 14:38:05 2005

Livetime : 100.0 Sec.  
Technique: Least Squares Fit

Elements Present:  
C(6), O(8), Al(13), Si(14), Nb(41)  
Possible Additional Elements:  
Ca(20), Ba(56), Ti(22)

Energy (keV)	Intensity (counts)	Elements Present	Elements Possible
0.271	1132	C Ka	
0.523	5583	O Ka	
1.485	26758	Al Ka	
1.736	20191	Si Ka	
2.144	1533	Nb La1	
*3.664	235		Ca Ka
*4.476	250		Ba La1
			Ti Ka
9.615	340	unidentified	
18.734	27	unidentified	

\* Check peak labels manually, or acquire additional data for better statistics and re-run Automatic Ident.

Wed Nov 16 14:39:13 2005

Refit \_Nb-K' \_Nb-K"  
Refit \_Nb-K  
Filter Fit Method  
Chi-sqd = 5.02 Livetime = 100.0 Sec.  
Standardless Analysis

Element	Relative k-ratio	Error (1-Sigma)	Net Counts	Error (1-Sigma)
C -K	0.08457 +/-	0.00299	1190 +/-	42
Si-K	0.43273 +/-	0.00464	18016 +/-	193
Al-K	0.48270 +/-	0.00466	21533 +/-	208
Nb-K	0.00000 +/-	0.00001	0 +/-	0
Nb-L	---	---	1840 +/-	133
O -K	---	---	5969 +/-	78

Adjustment Factors	K	L	M
Z-Balance:	0.00000	0.00000	0.00000
Shell:	1.00000	1.00000	1.00000

\*\* Warning \*\* Nb-K Not Excited at 15.00 kV  
RESULTS MAY BE IN ERROR !!

PROZA Correction Acc.Volt.= 15 kV Take-off Angle=35.00 deg

\*\* Warning \*\* Proza Model Limits Exceeded For C -K.  
Increase Acceleration Voltage

\*\* Warning \*\* Proza Model Limits Exceeded For Si-K.  
Increase Acceleration Voltage

\*\* Warning \*\* Proza Model Limits Exceeded For Al-K.  
Increase Acceleration Voltage

\*\* Warning \*\* Proza Model Limits Exceeded For Nb-K.  
Increase Acceleration Voltage



\*\* Warning \*\* Proza Model Limits Exceeded For O -K.  
Increase Acceleration Voltage

Number of Iterations = 8

Element	k-ratio (calc.)	ZAF	Atom %	Element Wt %	Wt % Err. (1-Sigma)	Compound Formula	Compound Wt %
C -K	0.0209	8.034	24.98	16.77	+/- 0.59	CO2	61.44
Si-K	0.1068	1.787	12.16	19.08	+/- 0.20	Si	19.08
Al-K	0.1191	1.635	12.92	19.48	+/- 0.19	Al	19.48
Nb-K	-1.#IND	-1.#IO	0.00	0.00	+/- 0.00	Nb	0.00
O -K	---	5.094	49.95	44.67 S	---	---	---
Total			100.00	100.00			100.00

Table Symbols: S -- Wt.% calculated by Stoichiometry

附錄二 高溫絕熱王合金鋼絲之原始量測資料數據

Wed Nov 16 13:24:15 2005

Livetime : 100.0 Sec.  
Technique: Least Squares Fit

Elements Present:  
C(6), Al(13), Si(14), Cr(24), Mn(25),  
Fe(26), Ni(28), Er(68), Yb(70), Ta(73)

Energy (keV)	Intensity (counts)	Elements Present	Elements Possible
0.271	7954	C Ka	
0.518	657	Cr La1	
0.636	---	Mn La1	
0.705	3586	Fe La	
0.864	327	Ni La1	
*1.485	310	Al Ka	
			Yb Ma1
*1.739	811	Si Ka	
			Ta Ma1
5.371	16088	Cr Ka	
5.886	2685	Mn Ka	
6.345	44535	Fe Ka	
6.991	5649	Er La1	
7.401	2568	Yb La1	
8.181	268	Ta La1	

\* Check peak labels manually, or acquire additional data  
for better statistics and re-run Automatic Ident.  
--- Peak's presence cannot be confirmed directly from the spectrum,  
but it is identified from higher energy lines of the element.

Wed Nov 16 13:31:20 2005

Refit \_Cr-L' \_Cr-L" \_Mn-L' \_Mn-L" \_Al-K' \_Al-K" \_Er-L' \_Er-L" \_Er-M' \_Er-M" \_Yb-L' \_Yb-L" \_Yb-M' \_Yb-M" \_Ta-L' \_Ta-L"

Refit \_Mn-L' \_Ni-L' \_Ni-L" \_Er-M' \_Yb-M' \_Ta-L

Filter Fit Method

Chi-sqd = 6.43 Livetime = 100.0 Sec.

Standardless Analysis

Element	Relative k-ratio	Error (1-Sigma)	Net Counts	Error (1-Sigma)
C -K	0.05569 +/-	0.00060	8471 +/-	92
Cr-K	0.15649 +/-	0.00217	19285 +/-	268
Cr-L	---	---	2376 +/-	140
Mn-K	0.01289 +/-	0.00256	1245 +/-	247
Mn-L	---	---	0 +/-	0
Fe-K	0.69388 +/-	0.00472	58760 +/-	400
Fe-L	---	---	7653 +/-	201
Ni-K	0.05911 +/-	0.00386	3213 +/-	210
Ni-L	---	---	955 +/-	82
Al-K	0.00057 +/-	0.00011	276 +/-	51
Er-L	0.01587 +/-	0.00375	795 +/-	188
Er-M	---	---	0 +/-	0
Yb-L	0.00551 +/-	0.00500	218 +/-	198
Yb-M	---	---	0 +/-	0
Ta-L	0.00000 +/-	0.00001	0 +/-	0

Ta-M --- --- 1061 +/- 136

Adjustment Factors

	K	L	M
Z-Balance:	0.00000	0.00000	0.00000
Shell:	1.00000	1.00000	1.00000

PROZA Correction Acc.Volt.= 15 kV Take-off Angle=35.00 deg  
Number of Iterations = 5

Element	k-ratio (calc.)	ZAF	Atom %	Element Wt %	Wt % Err. (1-Sigma)
C -K	0.0477	3.259	46.38	15.53	+/- 0.17
Cr-K	0.1340	0.922	8.51	12.35	+/- 0.17
Mn-K	0.0110	1.060	0.76	1.17	+/- 0.23
Fe-K	0.5940	1.056	40.28	62.73	+/- 0.43
Ni-K	0.0506	1.097	3.39	5.55	+/- 0.36
Al-K	0.0005	1.952	0.13	0.10	+/- 0.02
Er-L	0.0136	1.382	0.40	1.88	+/- 0.44
Yb-L	0.0047	1.474	0.14	0.70	+/- 0.63
Ta-L	0.0000	1.450	0.00	0.00	+/- 0.00
Total			100.00	100.00	

※以上報告 特別感謝中央大學 超塑性實驗室 李雄老師 支持教導!!