



Experiences with large scale production of Nb cavity material for CEBAF Upgrade and SNS

C. Reece

CEBAF 12 GeV Upgrade

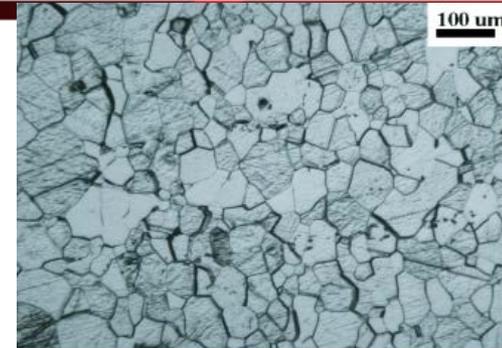
- Batch of 86 7-cell 1.5 GHz LL cavities
 - “Standard” fine-grain RRR>250 Nb sheet stock
 - Material purchase was by cavity vendor
 - No ultrasonic or SQUID scanning QA was specified
 - Learned later informally that sheets were scanned anyway @ DESY
 - No knowledge of any rejected material
 - Contract was “build-to-print,” no rf performance criterion
 - Only 1 cavity was limited by a flaw, and that was not clearly associated with material quality
 - All project requirements were exceeded

Customer Messrs. 御納入先 research instruments 殿		MATERIAL TEST RESULTS					No. 24770							
Surveyor 御立会者 殿		Date 日付 Oct 29, 2009					TOKYO DENKAI CO., LTD. 東京電解株式会社							
Material 材質 Nb Article 品名 Sheet		Quantity 数量 pcs or gr		Mechanical properties 機械的特性										
Specification No. 仕様書番号		Spec 規格		min max		T.S 引張強さ Kq/mm ²		Y.S 耐力 Kq/mm ²		Erong 伸び %		Hardness かたさ Hv		E.V. エリクセン値
Lot No.				Size 寸法 mm		Test Results 試験結果		Longitudinal 173 N/mm ² 173 N/mm ²		48.2 N/mm ² 49.2 N/mm ²		52.8 % 53.4 %		44.9
Lot No.		Chemical Composition (in Wt%) 化学成分												
Element 成分		Ta	W	Ti	Fe	Si	Mo	Ni	Zr	Hf				
Spec 規格		min	max											
Test Results 試験結果		0.0158	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Element 成分		Chemical Composition (in Wt%) 化学成分												
Spec 規格		min	max											
Test Results 試験結果		<0.001	<0.001	<0.0005	<0.001									
Remarks 備考		Starting Ingot No. NC-1517 RRR Value of Sheet: 301 Grain size ASTM #6										Inspection Section Manager 課長 <i>Kohichi Takemichi</i> Engineer 担任		
T.S.=Tensile Strength		Y.S.=Yield Strength			E.V.=Erichsen Value									

SNS Material Issue -1

JLAB-TN-02-027

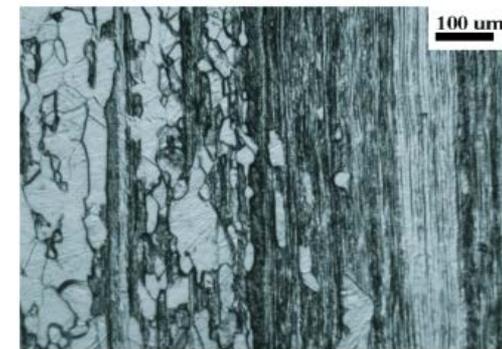
- One batch of Nb material supplied for SNS cavities showed very low yield strength after 800°C bake.
- Nb was found to be **not fully recrystallized** - supplier accepted all material back – replacement was OK.
- All sheets were scanned. None was rejected for cavity fabrication.
- Localized flaws were not identified as performance limitations.



a)



b)



c)

A. Wu, G. Myneni

Fig.6

- Cavity endgroups were fabricated from reactor grade Nb.
- Material for some components was found to have RRR < 25.
- Due to concern for thermal conductivity, endgroup parts were HT @ 1250°C in Ti box for solid state gettering – post-purification.
- RRR increased to > 50.



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