



Imaging Fiber Options for the Merit Experiment

T. Tsang, BNL 21 Feb 2006

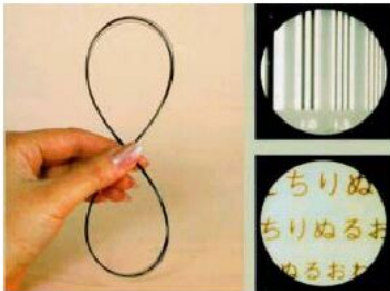
Sumitomo imaging fibers

TP03105B

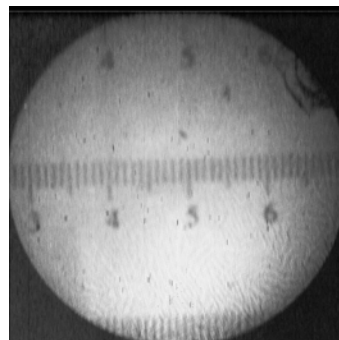
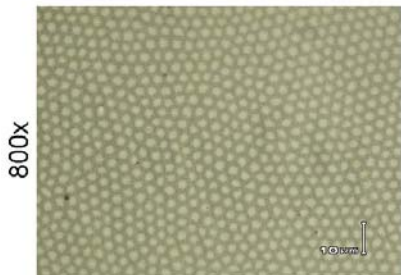
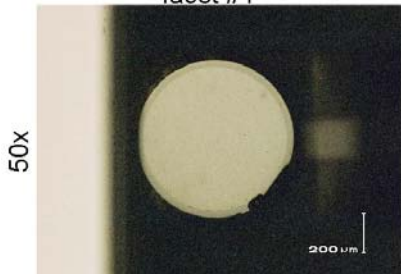


Product Lineup

Rad-hard to 1 Mrad



IGN-08/30 sample
0.3-meter
30,000 pixels
facet #1



	IGN-02/03	IGN-028/06	IGN-035/06	IGN-037/10	IGN-05/10	IGN-08/30	IGN-15/30	IGN-20/50
Number of picture elements	3,000	6,000	6,000	10,000	10,000	30,000	30,000	50,000
Jacketing diameter (um)	200	280	350	370	500	800	1,500	2,000
Picture elements area diameter (um)	180	252	315	333	450	720	1,350	1,800
Coating diameter (Primary) (um)	250	340	420	450	590	960	1,900	2,400
Coating diameter (Secondary) (um)	---	---	---	---	---	---	2,500	3,000
Circularity	>= 0.93							
Core material	GeO2 Containing Silica							
Cladding material	F Containing Silica						Pure Silica	
Coating material	Silicone						Silicone + PFA	
Numerical aperture	0.35						0.30	
Lattice defect (%)	<= 0.1							
Allowable bending radius (mm)	10	15	15	20	25	40	75	100
Allowable max temp. (C)	150							

Copyright © 2003 Sumitomo Electric Industries, LTD.
SEI Proprietary and Confidential.



Cost per foot	\$78	\$158	\$305
Cost in 10 meter	\$2574	\$5214	\$10065
Total cost for 4 fibers (40 meter)	\$10.3k	\$20.8k	\$40.3k

price quote

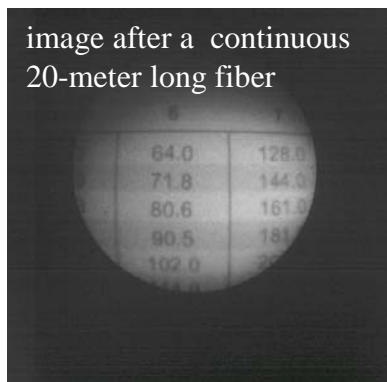
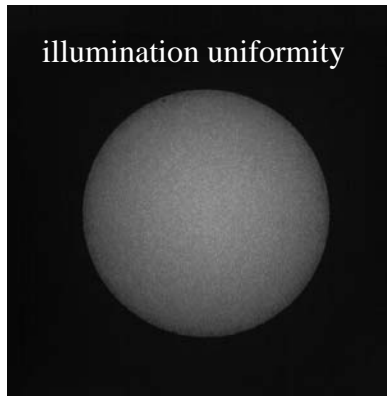
continuous
10-20 meter
available

continuous
10 meter
maybe available

Fujikura imaging fibers



Fujikura data, FIGH-30
A continuous 20-meter fiber
30,000 pixel imaging fiber



ULTRATHIN IMAGEFIBER SPECIFICATIONS (FIGH series N-Type 50k-100k)

Table 3

Item	FIGH-30-850N	FIGH-50-1100N	FIGH-70-1300N	FIGH-100-1500N
Number of picture elements(nominal)	30,000	50,000	70,000	100,000
Imagecircle diameter (um)	790 ± 50	1,025 ± 80	1,200 ± 100	1,400 ± 120
Fiber diameter (um)	850 ± 50	1,100 ± 80	1,300 ± 100	1,500 ± 120
Coating diameter (um)	950 ± 50	1,200 ± 100	1,450 ± 100	1,700 ± 150
Minimum bending radius (mm)	90 ^{*1} _50 ^{*2} _	110 ^{*1} _80 ^{*2} _	150 ^{*1} _100 ^{*2} _	200 ^{*1} _130 ^{*2} _
Coating material	Silicone resin			
Lattice defect (%)	< 0.1			
Uncircularity (%)	< 5			
length/pc	Maximum length of 1pc : 10ft Cut and rough polish are available. Cut length of 1pc : Customer order			

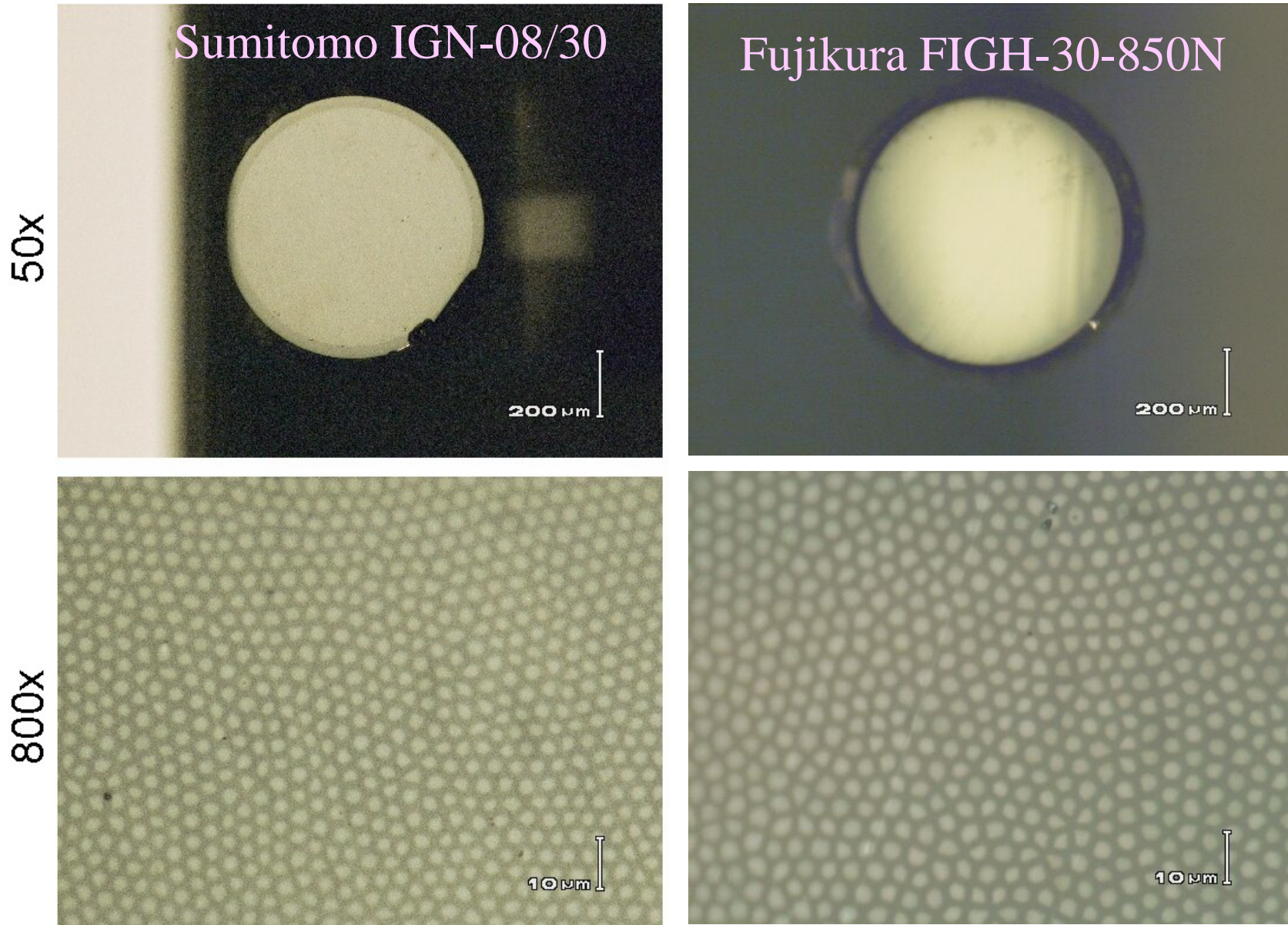
Cost per foot	\$85	\$250		\$540
Cost in 10 meter	\$2805	\$8250		\$17.8k
Total cost for 4 fibers (40 meter)	\$11.2k	\$33k		\$71.8k

unofficial price info

official price info

Cost/foot	\$210	\$371.4		
Cost in 10 meter	\$6,935.65	\$12,256.7		
Cost in 20 meter	\$15,607.9			
Total cost for 4 fibers (40 meter)	\$27,742.6	\$49,026.8		

30,000 picture elements



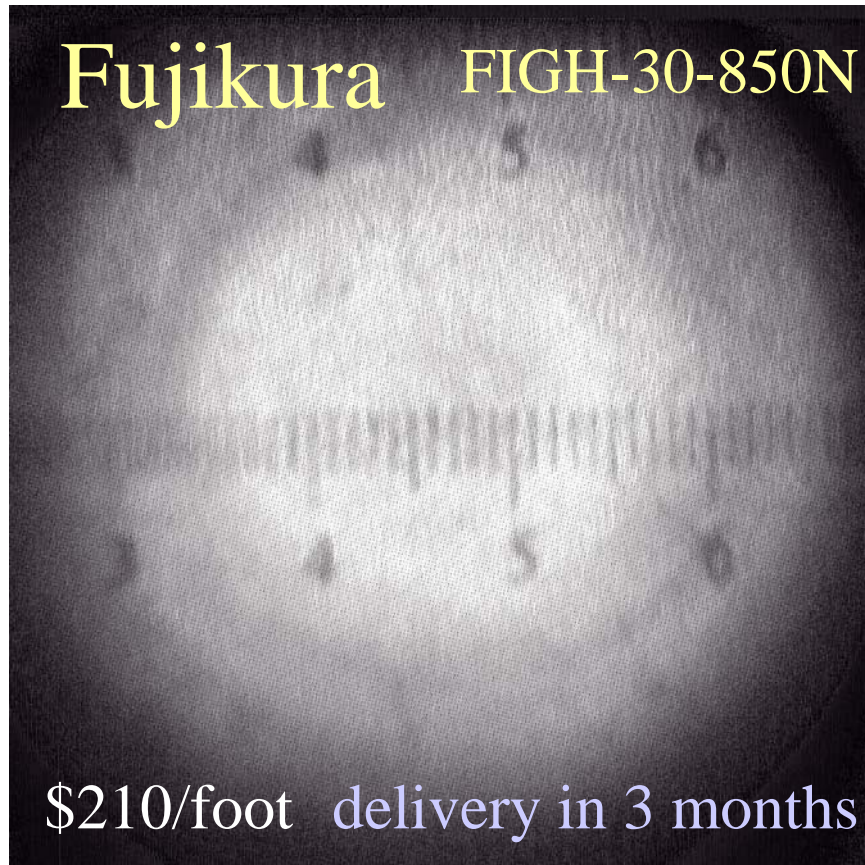
NO significant difference in the uniformity of imaging fibers

Image quality comparison

25 cm long

30,000 pixels, 1-mm diameter

30 cm long



camera SMD illumination
NIR pulse, 10 us/frame

NO significant difference in image quality
Should go with Sumitomo fibers