

EC material and fiber test

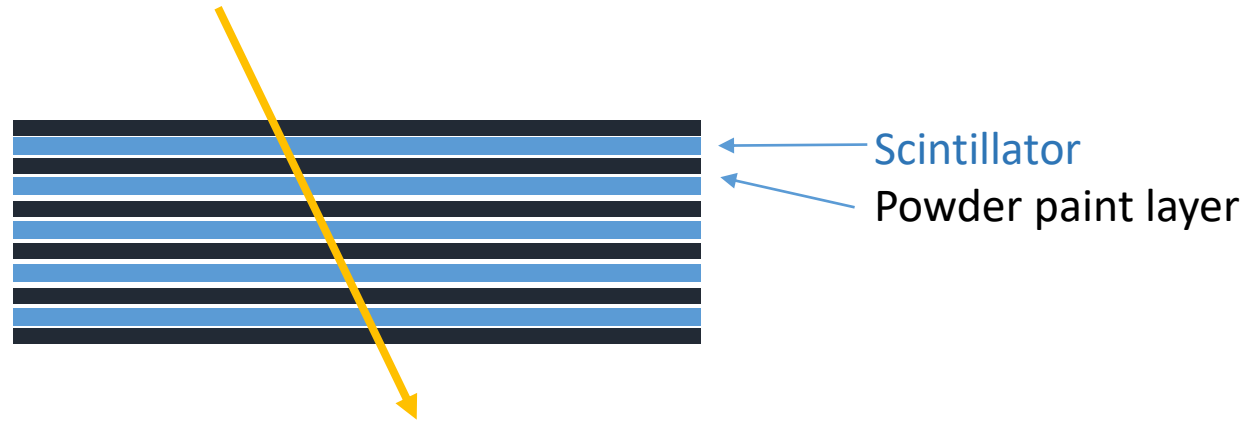
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Scintillator test for different batch

Scintillator	sample 1	sample 2
batch2	78.3	84
batch3	79	80.4



reflector test of tyvek and powder painting

Scintillator Sample 1	Powder painting	tyvek	Powder painting + tyvek
batch2	78.3	73.3	85.6
batch3	79	75.3	

Result shows :

1. Batch 2 and 3 have similar light yield
2. Powder painting only improve little comparing with tyvek

More tests will be perform to check again

Fiber mirror reflector selection and test

- To collect light as much as possible from one end, It's necessary to add mirror reflector at the other end. And only the 'mirror' reflector is applicable.
- Three polishing methods are applied: fiber factory polish, milling cutter in SDU and small polishing machine in SDU.
- Four kinds of reflectors are applied: mirror tape, ordinary mirror painting, metaling painting, and aluminum sputtering mirror made by factory.

Three polishing method quality

Fiber company:

(professional fiber polishing company in Nanjing, China)

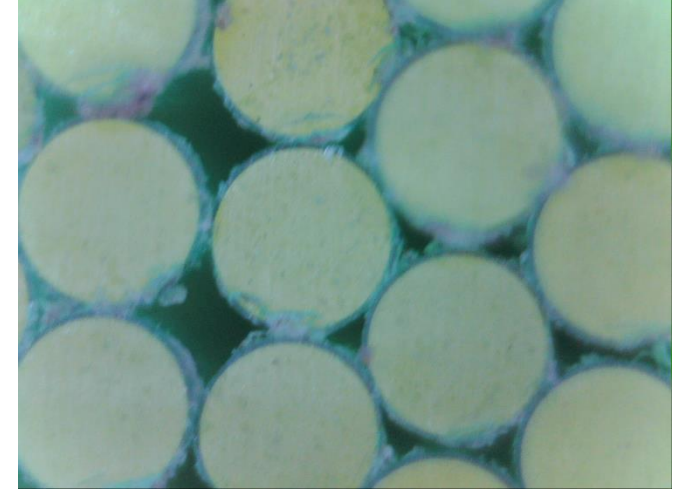
Polish fiber one by one, very good quality, high price (about 4 RMB/one end of each fiber)



Milling cutter in SDU

Polished by a ordinary milling cutter in SDU, high efficiency but low quality.

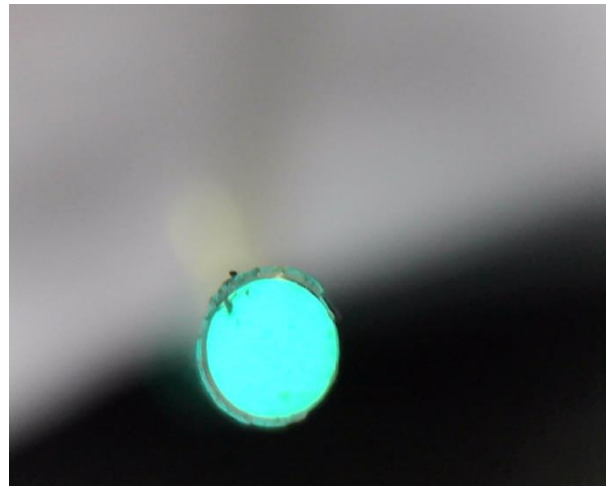
The polishing quality is even worse than the quality used in SDU#1#2#3
Try to improve.



Small polishing machine in SDU

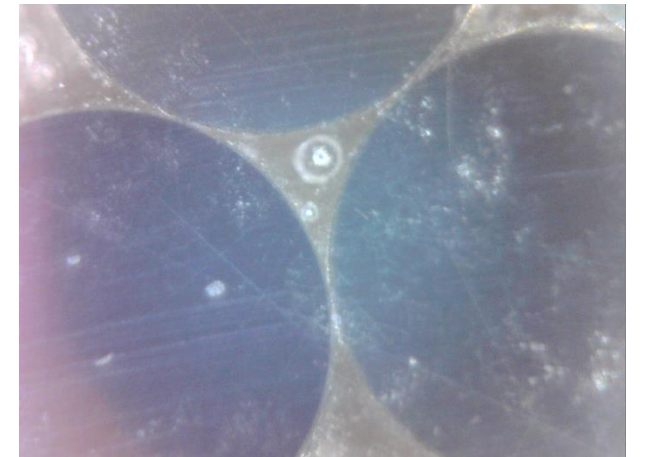
Polish fiber by very fine emery paper with polishing machine.

Really flat end, low efficiency(20fibers/20mins), small cladding damage, efficiency and damage could be improved by changing the fiber holder design.



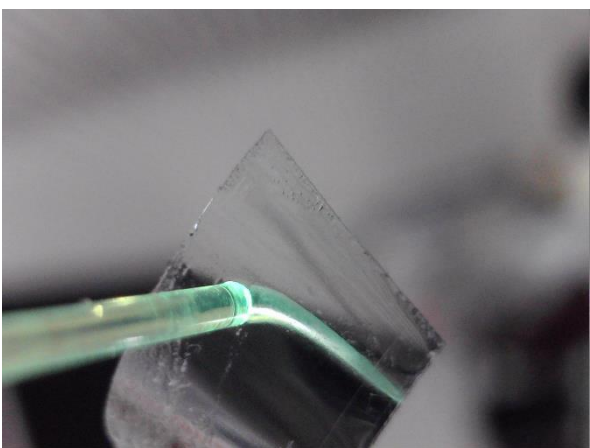
Clear fiber in bundle polished by fiber company

The fiber bundle of SDU#4 and #5 will be polished by this company.

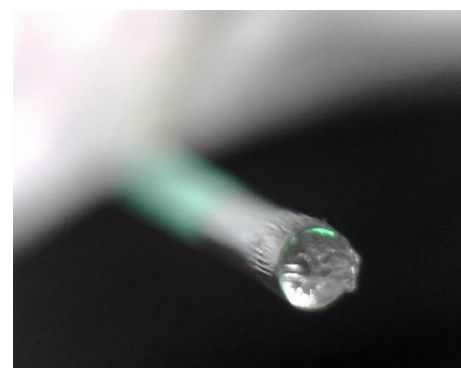


Reflector selection in test

Silver Polyester Film Tape(mirror tape)

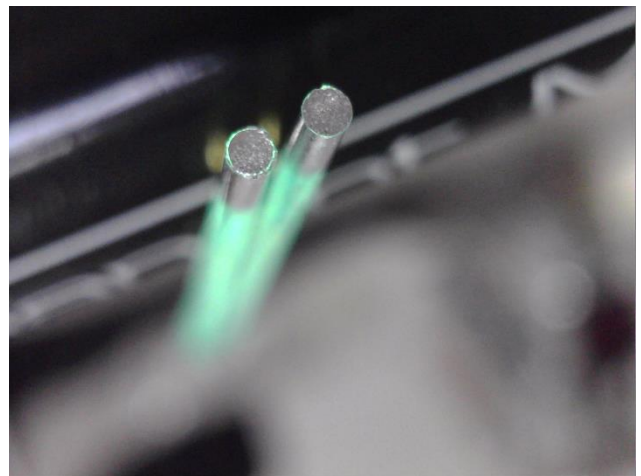


Ordinary mirror like painting
Cheap, bad quality.



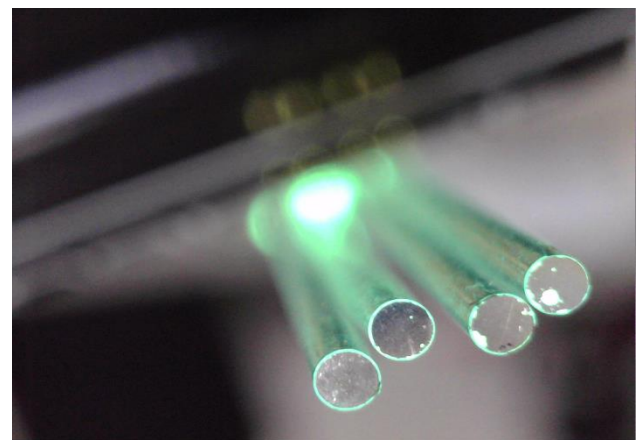
Silver metaling painting ink (60RMB/18ml)

Easy to handle, just dig fiber into ink for several times.
Good quality, really hard to shed only for the fiber end polished by company



Aluminum sputtering mirror

Not sure the specific technology. The technology that add metal mirror on plastic is mature.
Really easy to shed, receive 10 fibers, and 5 fibers are already shed in shipping. (just receive today)



Test method

- Test include both polishing quality and reflector test
- The ends that coupled to PMT are polished by Small polishing machine, only the polishing of the other end is different
- The reflector is only used in the end with different polishing method
- Most fibers are tested without reflector firstly and then with reflector



Test result

Polish method	Reflector type	Fiber No.	QDC channel Without reflector	QDC channel With reflector	improvement
Fiber company	tape	1	1247	1953	0.566
		2	1317	2150	0.63
		3	1350	2130	0.578
		4	1468	2200	0.59
	Silver metaling painting ink	5	1470	1918	0.305
		6	1315	1902	0.57
		7	1488	2024	0.36
Milling cutter	tape	1	1120	1700	0.518
		2	1612	2498	0.55
		3	1129	1581	0.4
	Silver metaling painting ink	4	1538	1774	0.161
		5	1533	1642	<0.1
Small polishing machine	tape	1	1570	2450	0.58
		2	1630	2267	0.39
	Silver metaling painting ink	3	1464	2045	0.31

Polish method	Reflector type	Fiber No.	QDC channel Without reflector	QDC channel With reflector	improvement
Fiber company	Aluminum sputtering mirror	1	1272		
		2	1264		
		3	1294		
		4		1835	0.43
		5		1430	0.11
		6		1582	0.23
		7		1550	0.21
		8		1410	0.11

For ordinary mirror like painting, all the improvement are below 0.1.

Fiber test result

- The fiber polished by company and small polishing machine are have good light yield.
- The fiber polished by Milling cutter in SDU have relative low light yield and uniformity is bad
- Light improvement with reflector of Milling cutter fiber is not as good as others

- Silver Polyester Film Tape has about 55~60% light improvement
- Silver metaling painting ink has about 30~40% light improvement
- Still not sure how good the sputtering method could achieve

Plan for next step

- We will make two bundles of fibers that made by company and one bundle by small polishing machine.
- Contact to the Aluminum sputtering company to improve technology.
- Silver metaling painting ink mirror would be a good choice for SDU #4 and #5, and we need a new module to test now.
- Improve the Milling cutter method