

# Fiber silver mirror test update

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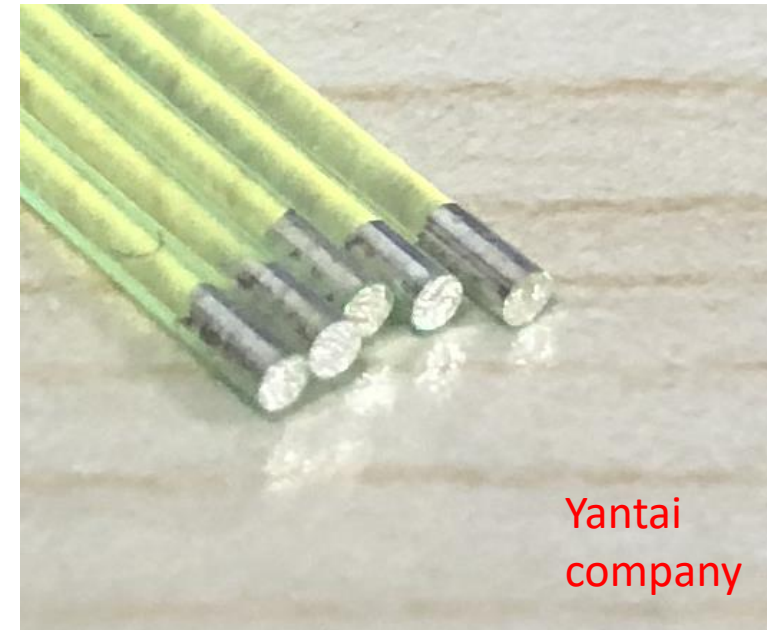
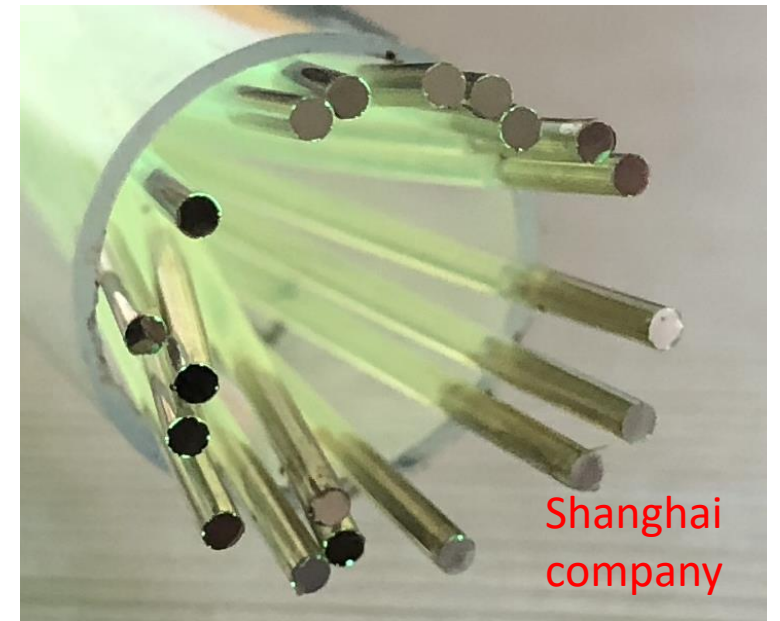
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# Fiber with silver mirror

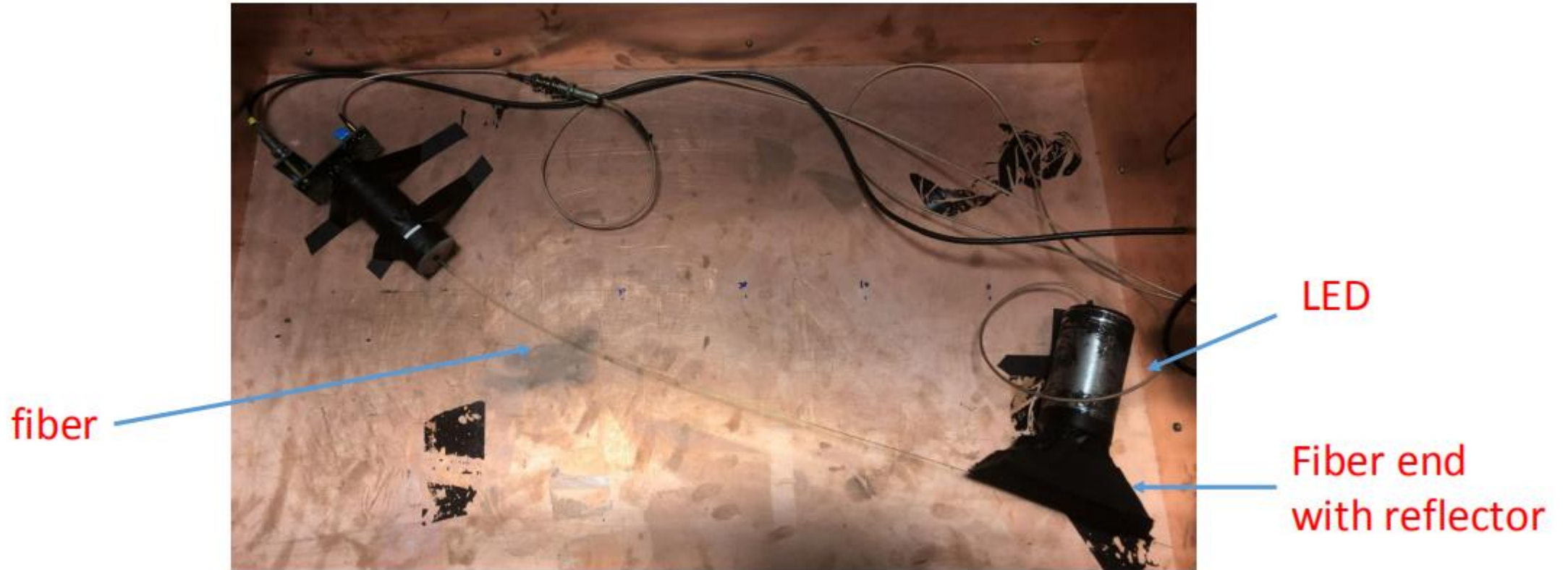
Four batches of fibers with silver mirror received:

- ① 20 from Shanghai Company with good quality and high price
- ② First batch from Yantai company
- ③ Second batch from Yantai company with fiber surface cleaning process
- ④ Third batch from Yantai company with thicker silver layer trial

These four batches have similar appearance quality, and the mirrors are formed by **steaming method**.



# Test method



- Integral charge acquired by **oscilloscope(10% =RMS/mean)**
- **Baseline(pedestal) changed randomly over time(about  $\pm 0.05\text{pC}$ )**, will add earth wire
- For the oscilloscope result showed last time, problem in oscilloscope readout and also baseline

# Fiber test result without mirror(reference fiber for each test)

## First test with QDC

	Fiber No.	test result(QDC channel, <b>pedestal 69</b> )
No reflector (As reference)	old 1	1340
	old 2	1451 ± 29.5
	1	1337
	2	1392 ± 28.7
	3	1363 ± 28.5
	4	1343 ± 27.8
	5	1445 ± 29.0
		<i>Error of mean value</i>
Average 1381 – 69 = 1312		

## Second and third test with oscilloscope

Second and third test use same test situation

### Second test

Fiber No.	Charge: pC Pedestal: <b>-0.6</b>
Old 1	3.13
2	3.05
3	3.37
4	3.02
5	3.25
Average	3.11+0.6= <b>3.71</b>

### Third test

Fiber No.	Charge: pC Pedestal: <b>-0.7</b>
2	3.14
3	3.39
4	3.35
Average	3.29+0.7= <b>3.99</b>

Reference fiber changed much than mirrored fiber.

# 1. Fiber from shanghai company

First test with QDC(showed before)

Good Sliver mirror	1	2651 ± 44.8
	2	2455 ± 42.4
	3	2671 ± 45.6
	4	2682 ± 48.6
	5	2627 ± 44.7
	6	2587 ± 43.6
	7	2710 ± 45.2
	8	2352 ± 41.1
	9	2660 ± 44.3
	10	2610 ± 44.9
	11	2716 ± 45.8
	12	2418 ± 42.0
	13	2695 ± 46
	14	2787 ± 46.5
	15	2661 ± 44.5
	16	2455 ± 42.4

Suppose 2600 - 69 = 2531

**This result shows improve more than 90%(2531/1312 =1.93).**

Second test

Fiber No.	Charge: pC Pedestal: -0.6
1	6.87
2	6.75
3	7
4	6.22
5	7.15
6	6.48
7	7.25
Average	6.82+0.6=7.42

**Improvement: 97%(7.42/3.71 =1.97).**

Third test

Fiber No.	Charge: pC Pedestal: -0.75
1	6.6
2	6.8
3	6.68
Average	6.69+0.75=7.44

**Improvement: 86%(7.44/3.99 =1.86).**

Signal changed a little, but reference fiber changed much, which influence reflectivity significantly.

## 2. First batch from Yantai company

- Three good fibers and other fiber trials
- Polished fiber + steamed sliver layer

	Second test	Third test
Fiber No.	Charge: pC Pedestal: -0.75	Charge: pC Pedestal: -0.72
1	5.1	5.23
2	5.6	5.57
3	5.18	4.85
Average	$5.29 + 0.75 = 6.04$	$5.22 + 0.72 = 5.94$
improvement	62.8%	48.7%

### 3. Second batch from Yantai company

- Polished fiber + 'electrical washing' + steamed sliver layer
- Two different groups received: with(B) and without(A) protection layer (painting used on circuit board)

Without protection layer

	Second test	Third test
Fiber No.	Charge: pC Pedestal: -0.63	Charge: pC Pedestal: -0.73
A1	6.05	5.82
A2	6.1	5.6
A3	6.05	5.95
A4	5.52	5.02
Average	$6.07 + 0.63 = 6.7$	$5.79 + 0.73 = 6.52$
improvement	78%	63.4%

Best ever from YanTai

With protection layer

	Second test	Third test
Fiber No.	Charge: pC Pedestal: -0.63	Charge: pC Pedestal: -0.72
B1	5.93	5
B2	6.18	6
B3	4.55	4.34

Not good in quality control, bad appearance.

## 4. Third batch from Yantai company

- Polished fiber + 'electrical washing' + steamed silver layer
- Try thicker thickness of silver layer, different group(A, B, C) have different thickness, too few samples, and no significant improvement

	Third test
Fiber No.	Charge: pC Pedestal: -0.73
A1	5.1
A2	5.9
B1	6
B2	5.95
C1	5.05

Similar result as the  
"first" test of batch 2.



# Conclusion

Error is too large with oscilloscope, try to setup QDC test(at least the pedestal of QDC is stable).

For fibers from Shanghai company:

- Still have good reflectivity: about **90%** (two months passed)

For fibers from YanTai company:

- Could reach nearly **80%**
- may **decrease slightly over time**
- Not good in quality control
- In contact all the time, work in improving quality
- Guarantee the price of fiber will not more than **¥ 10/each in batch**