



Tungsten Powder Studies at Fudan

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Outline

- PIXE test results for some samples
- The tap density testing of different samples
- Epoxy glued powder test
- Next plan





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Samples from different Co.





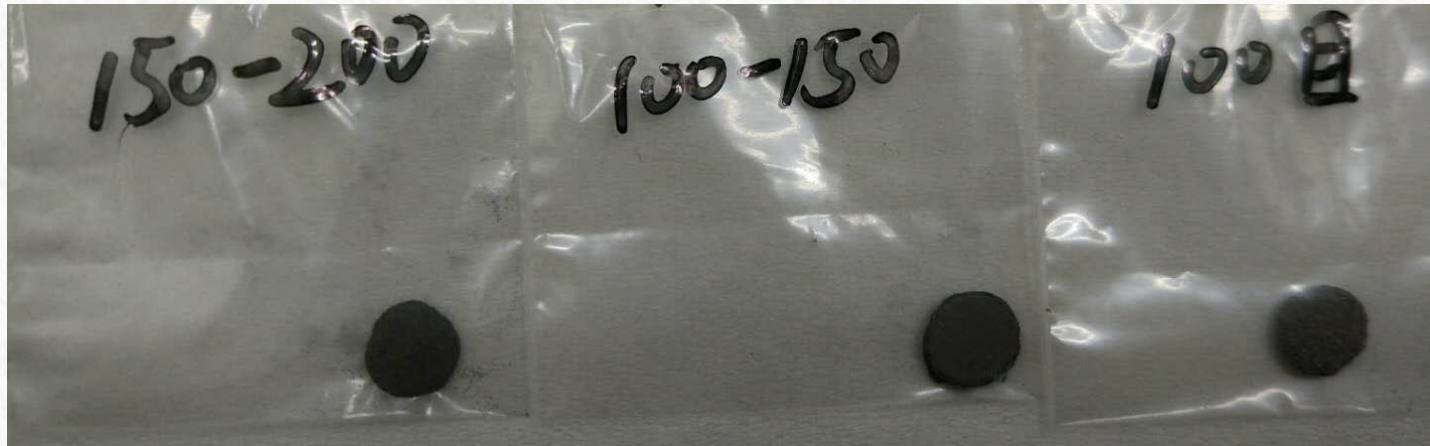
PIXE test for powder samples

- Using a tablet press to make samples

Sample1
99.99%

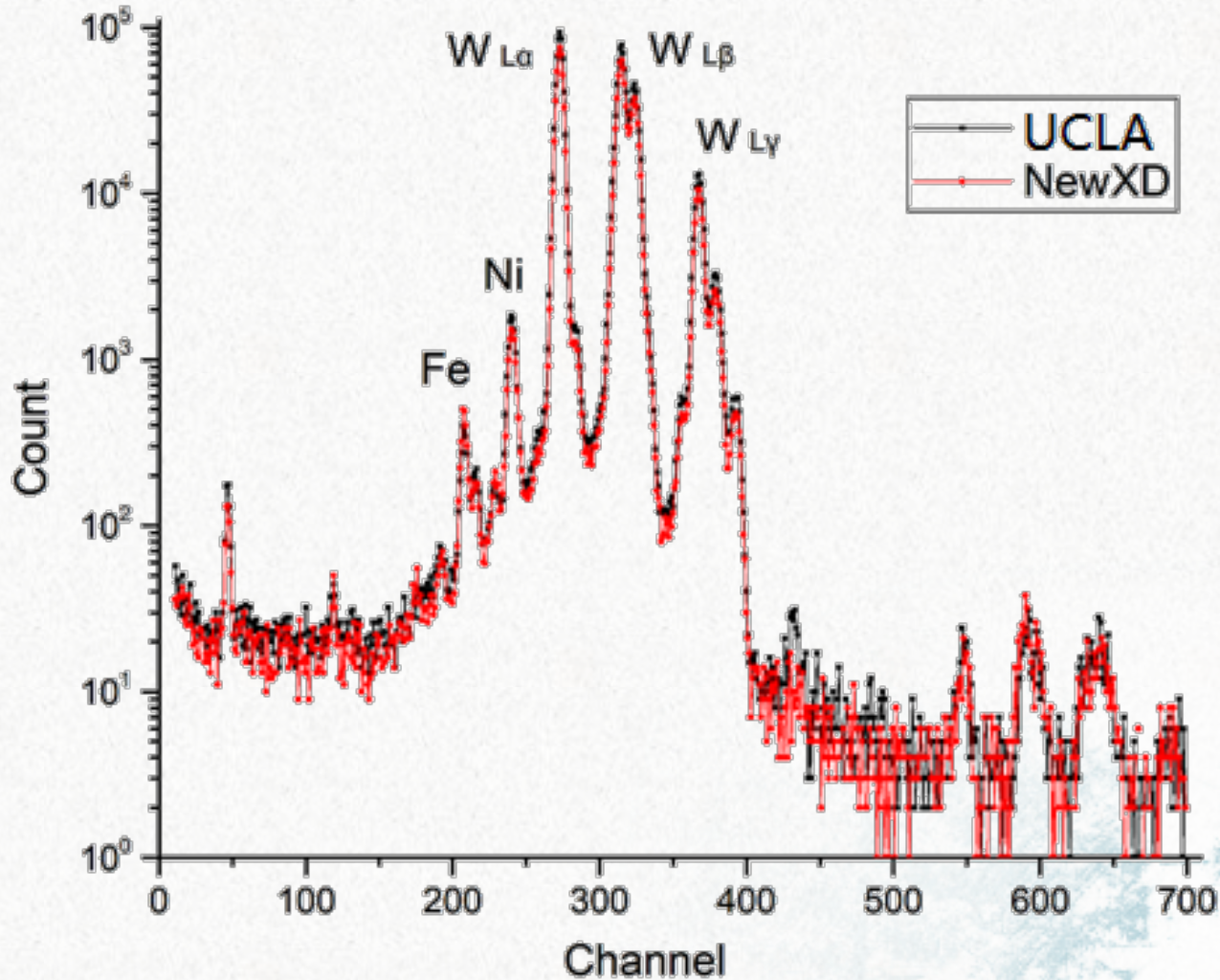
Sample2
99.9%

UCLA
99.3%





PIXE test for two samples





PIXE test for two samples

Element	Atomic Percentage			Mass Fraction		
	UCLA	Sample1	Sample2	UCLA	Sample1	Sample2
V	0.000%	0.032%	0.024%	0.000%	0.009%	0.007%
Cr	0.034%	0.045%	0.145%	0.010%	0.013%	0.041%
Mn	0.068%	0.078%	0.063%	0.020%	0.023%	0.019%
Fe	0.324%	0.500%	0.526%	0.098%	0.152%	0.160%
Co	0.027%	0.028%	0.021%	0.009%	0.009%	0.007%
Ni	0.037%	1.019%	0.087%	0.012%	0.325%	0.028%
Cu	0.020%	0.103%	0.030%	0.007%	0.036%	0.010%
Zn	0.041%	0.048%	0.028%	0.015%	0.017%	0.010%
Ga	0.011%	0.000%	0.000%	0.004%	0.000%	0.000%
Ge	0.015%	0.038%	0.005%	0.006%	0.015%	0.002%
As	0.031%	0.013%	0.022%	0.013%	0.005%	0.009%
Se	0.000%	0.000%	0.003%	0.000%	0.000%	0.001%
Br	0.036%	0.000%	0.000%	0.016%	0.000%	0.000%
Kr	0.000%	0.005%	0.000%	0.000%	0.002%	0.000%
Rb	0.000%	0.000%	0.004%	0.000%	0.000%	0.002%
Sr	0.003%	0.000%	0.000%	0.001%	0.000%	0.000%
Y	0.000%	0.000%	0.001%	0.000%	0.000%	0.000%
Zr	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
W	100.000%	100.000%	100.000%	100.000%	100.000%	100.000%
Hg	0.013%	0.000%	0.000%	0.014%	0.000%	0.000%





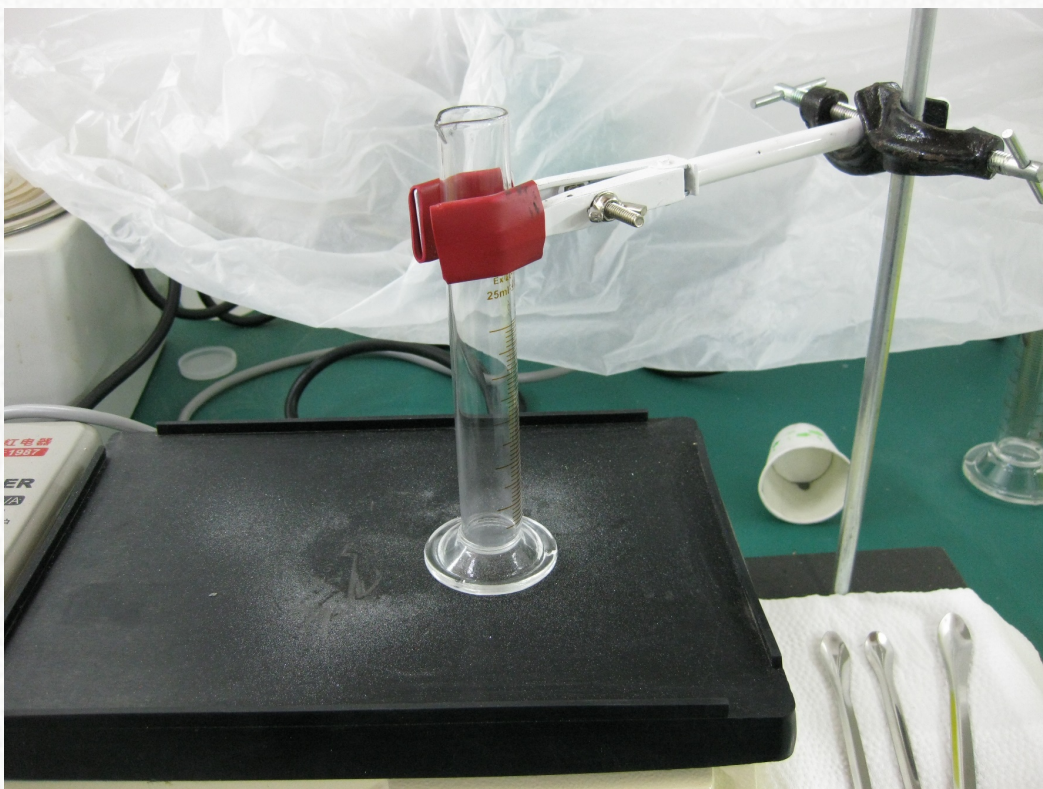
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Tap density measuring



Size	Max. scale	Min. scale	Weight
Big	100 ml	1 ml	138.0 g
Medium	50 ml	1 ml	73.0 g
Small	25 ml	0.5 ml	52.2 g





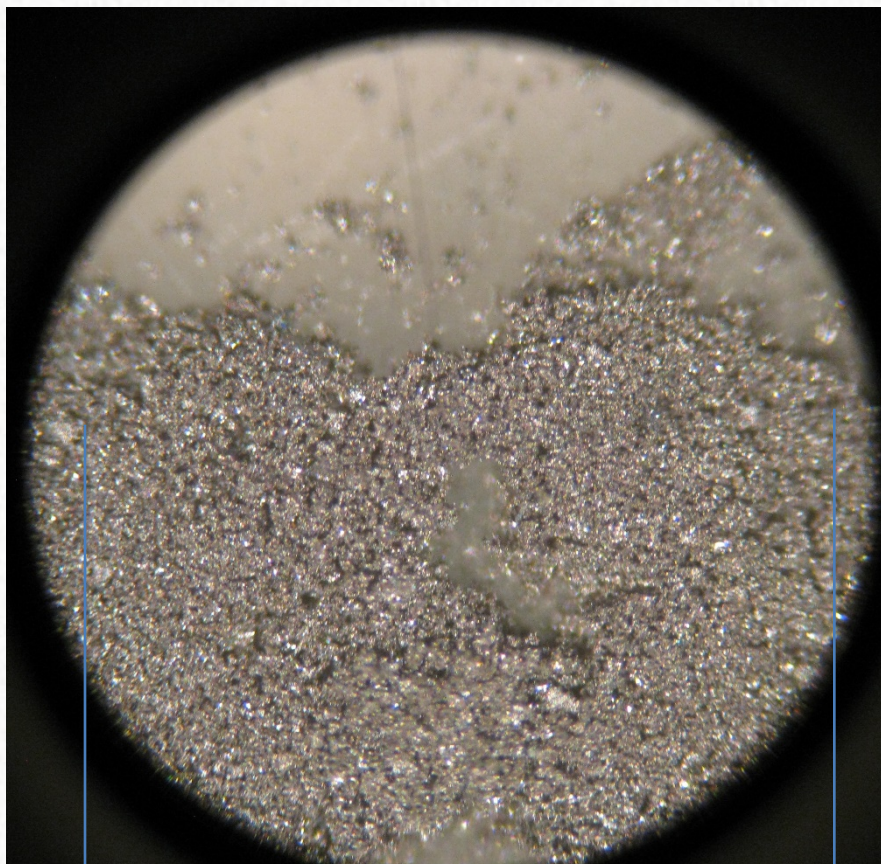
Tap density test

	Sample	Container	Gross weight /g	Net weight /g	Bulk /ml	Time /mins	Tap density /g/cm ³
1	XD	Big	492.1	354.1	42	12	8.43
2	XD	Big	492.1	354.1	40	20	8.85
3	XD	Medium	409.7	336.7	38	20	8.86
4	GZ	Small	210.9	158.7	17	20	9.33
5	YT	Small	129.1	76.9	8.5	20	9.04
6	JJ	Small	160.1	107.9	11.2	20	9.63
7	GY	Small	106.0	53.8	15.5	20	3.47

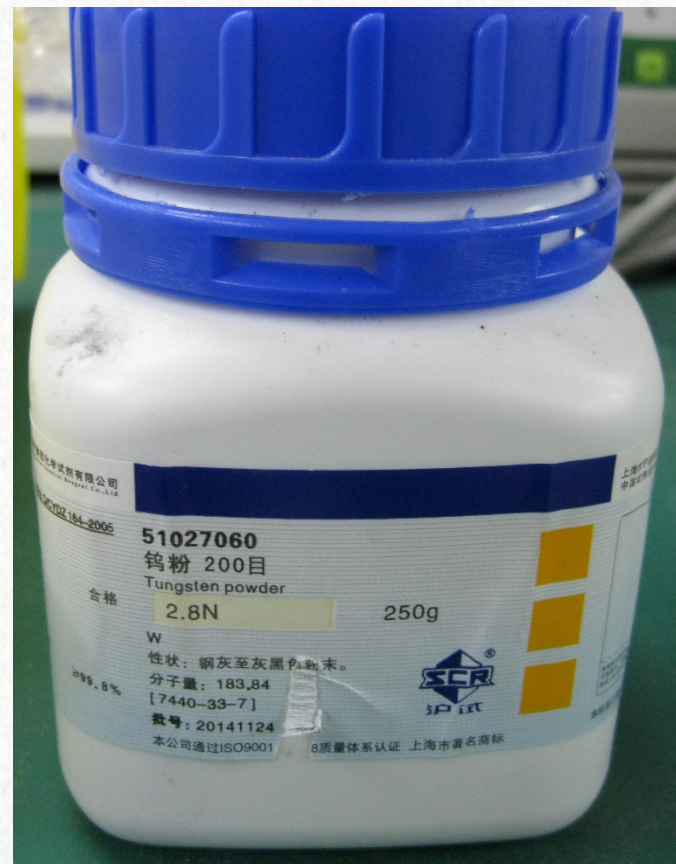




Sample from GY

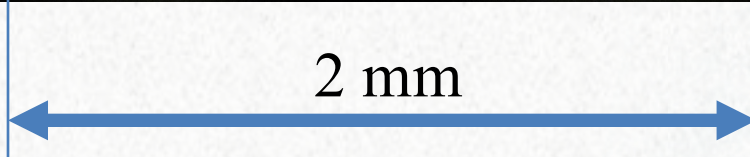
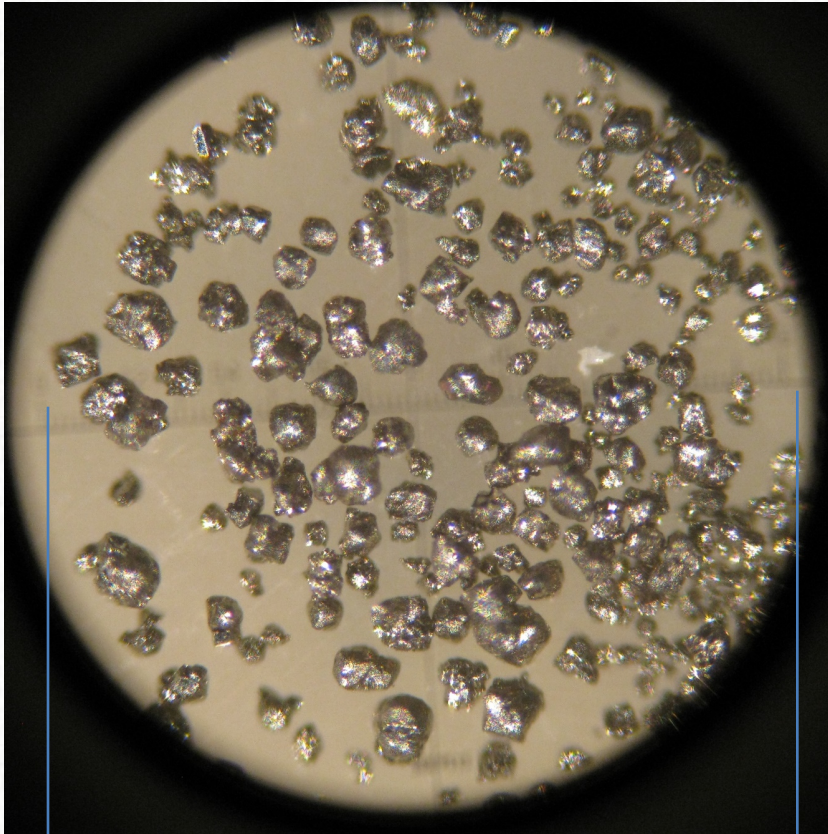


2 mm





Sample from UCLA



particle size
distribution 90%
between 40 and 150
microns

Tap density:
 $\sim 11.25 \text{ g/cm}^3$

Ref.: Journal of Physics: Conference Series **404** (2012) 012023

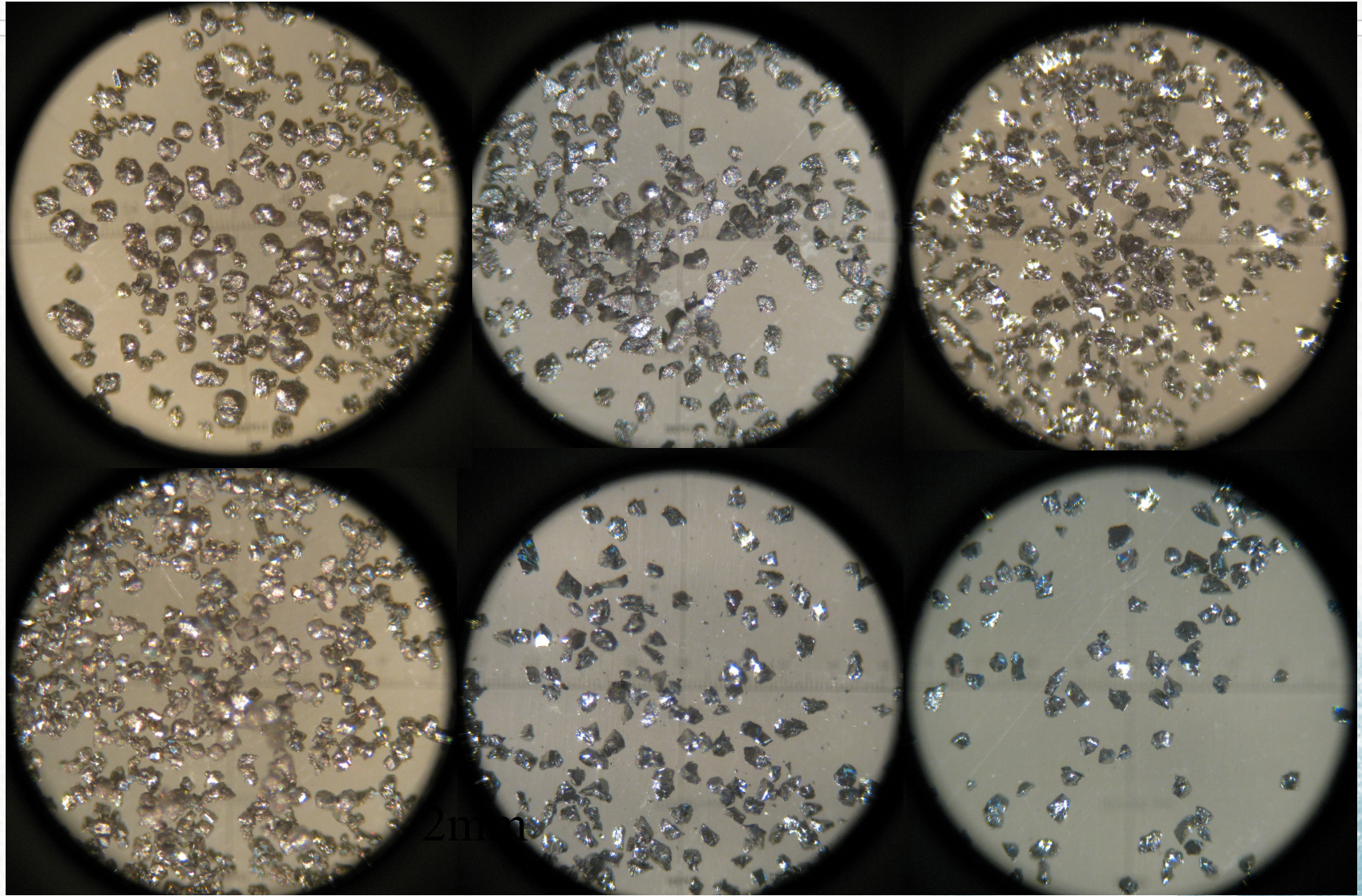




UCLA:11.25

XD1

XD2:8.86



JJ:9.63

GZ:9.33

YT:9.04



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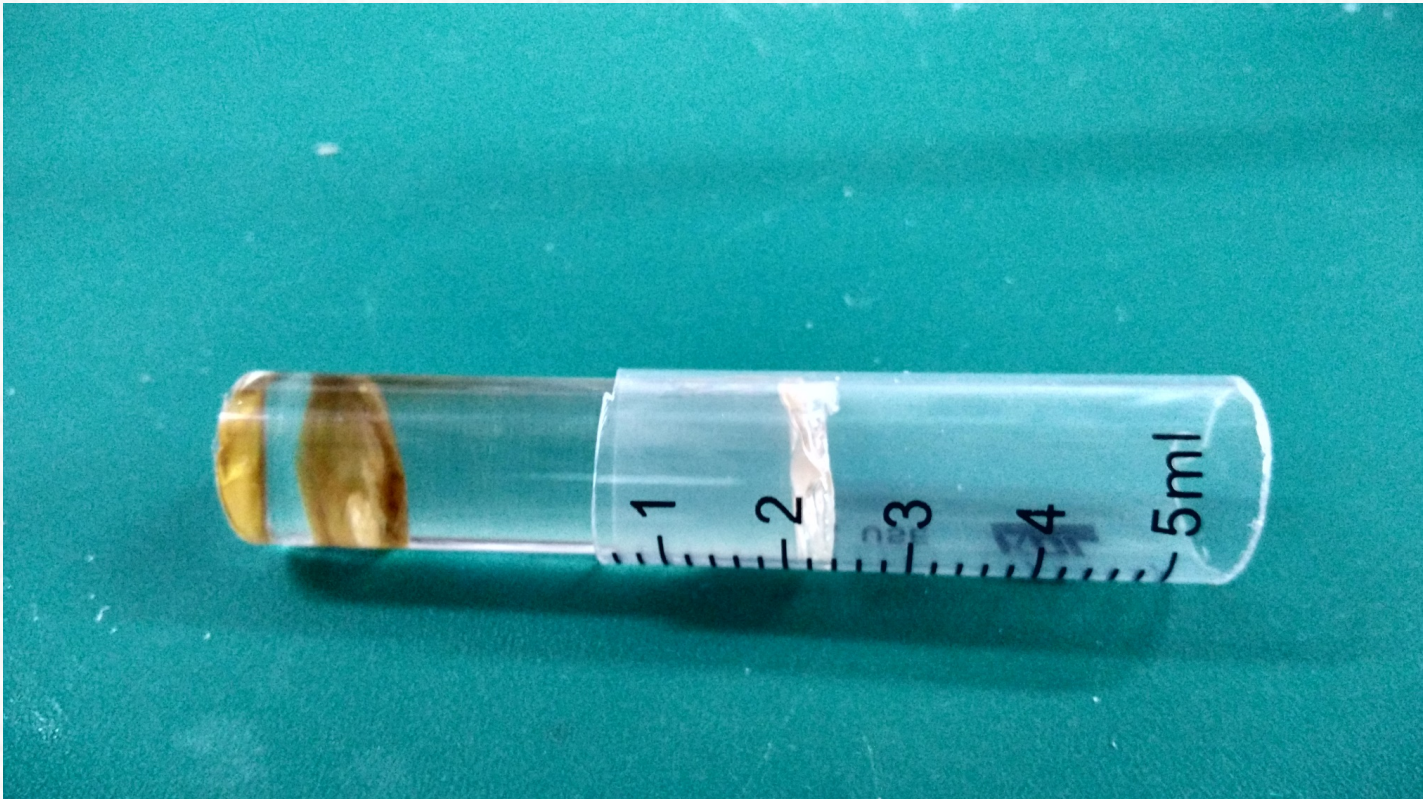
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Epoxy and mold test

Optical grade epoxy

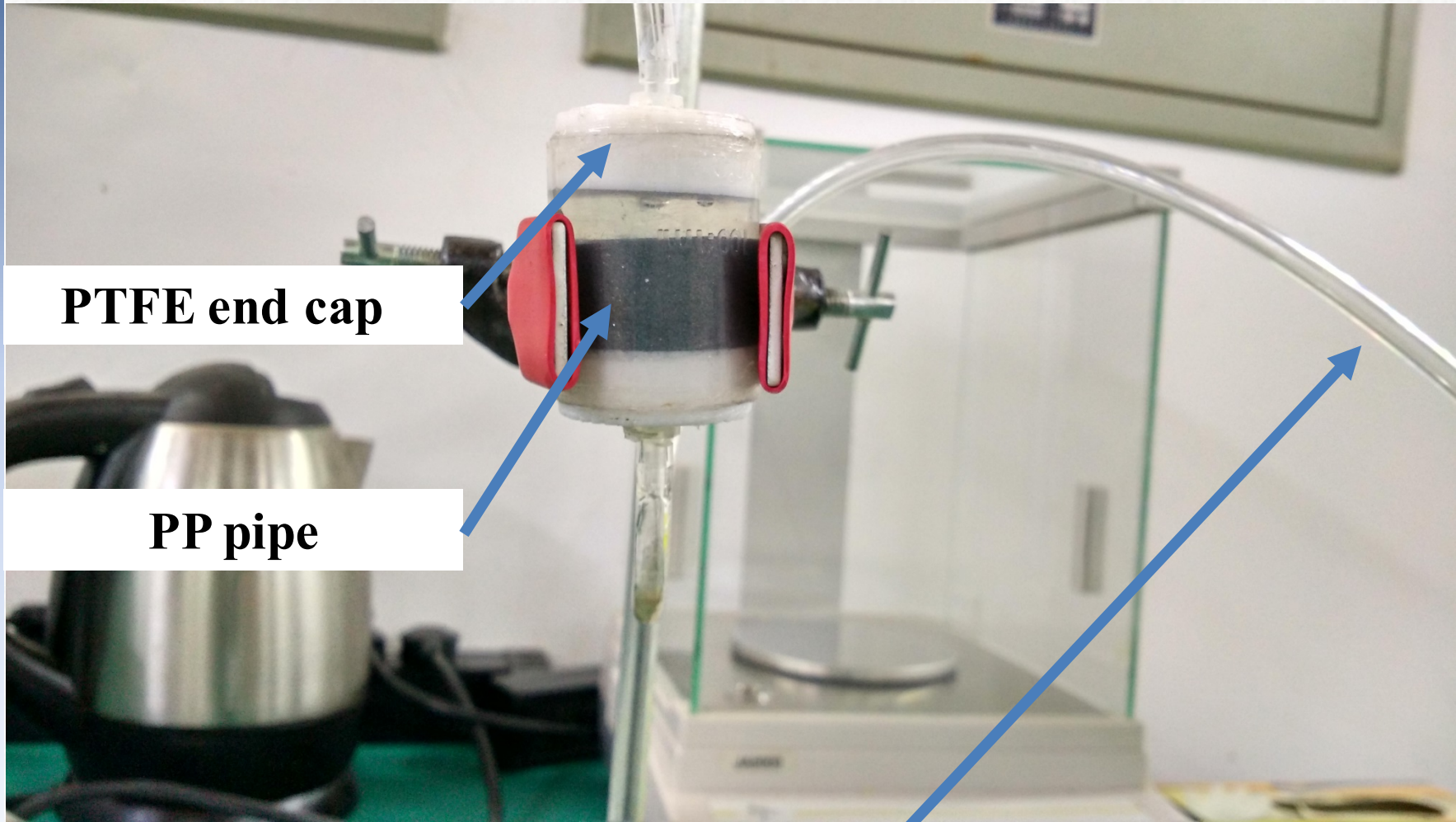


Use a syringe(PP) as mold, sample can take out easily





Epoxy glued W powder test



PTFE end cap

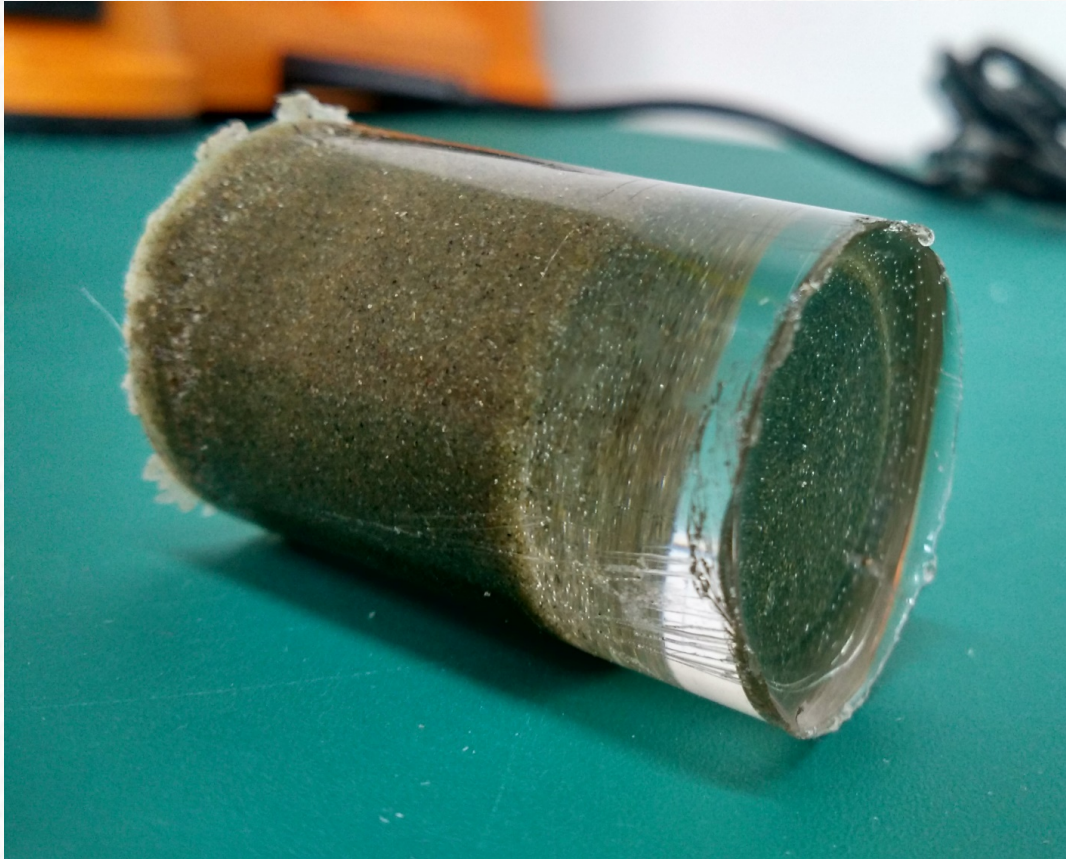
PP pipe

Pump if need





Epoxy glued sand test



100 mesh sand



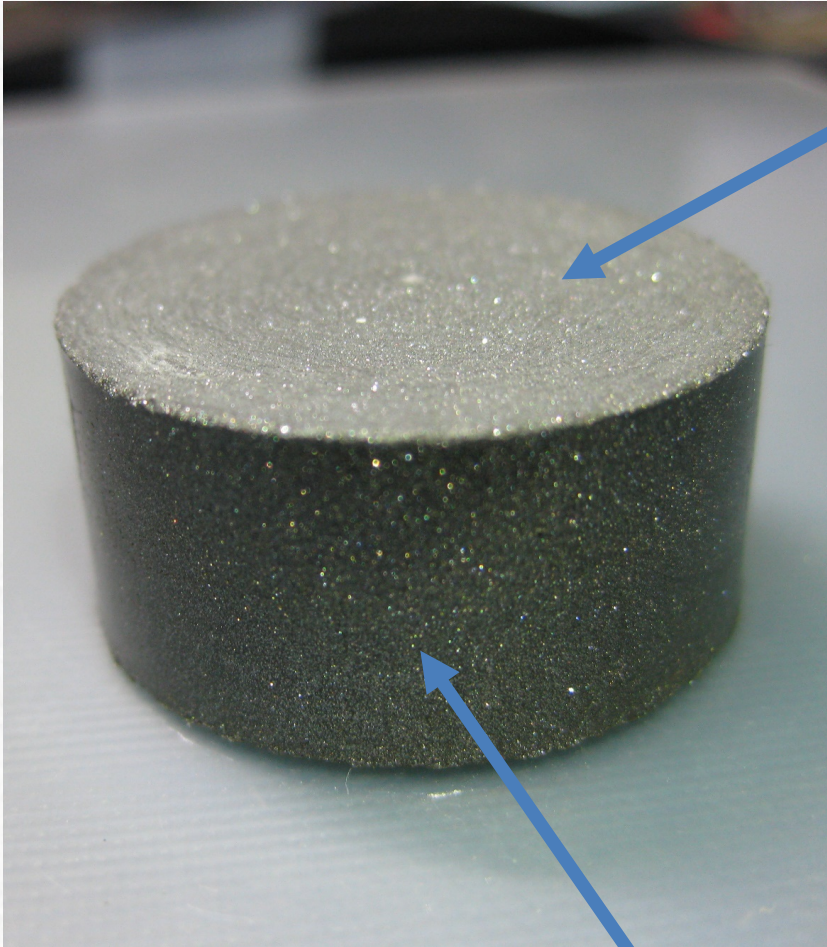


Epoxy glued W powder test





Use lathe tunes both ends



Tuning surface is rough

Powder tap density:
 8.86 g/cm^3

Glued density:
 $\sim 9.2 \text{ g/cm}^3$

Close but not enough

Side surface is very smooth





Next plan

- Do PIXE test for good tap density samples;
- Try different size powder to see if can get higher tap density;
- Machine cuboid mold, change mold materials and test glue process;
- Machine screens for fiber and assembling test.





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Thank you!

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