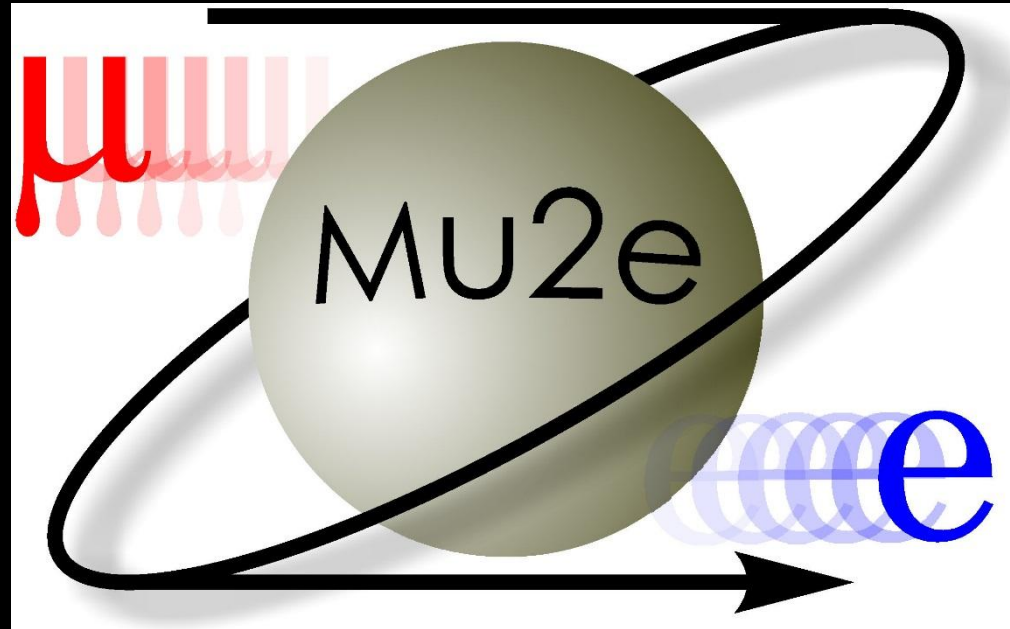


Seam Width & Linear Density Measurements



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08/01/2017

Seam Width Measurements (cont.)

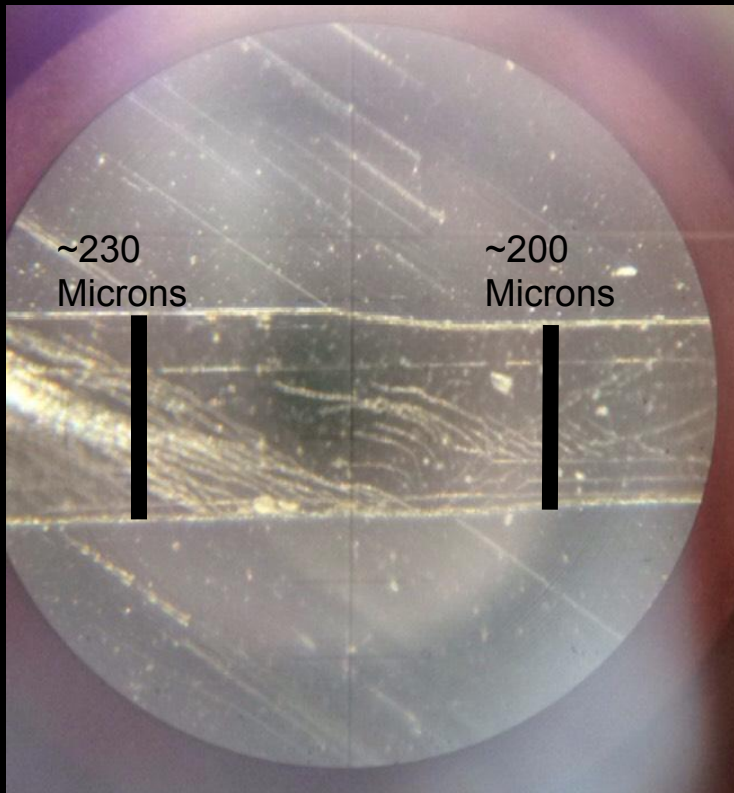
- ❖ Calibrated the 12.5X objective using AmScope calibration slide (0.01 mm resolution). Average of 23 data points yielded (1.25 ± 0.02) div/micron.

- ❖ Tested calibration by measuring Au-W wire with nominal diameter of 20 microns.
 - Three readings of 25.5, 24.5, and 25 div for diameter gives average of (20 ± 0.3) microns.

Divisions	Scale (mm)	Div per 0.01 mm	div per micron
758	0.6	12.6	1.26
632.5	0.5	12.7	1.27
504.5	0.4	12.6	1.26
102	0.08	12.8	1.28
100	0.08	12.5	1.25
101.5	0.08	12.7	1.27
88.5	0.07	12.6	1.26
88.5	0.07	12.6	1.26
75.5	0.06	12.6	1.26
75.25	0.06	12.5	1.25
63.5	0.05	12.7	1.27
63.5	0.05	12.7	1.27
63.5	0.05	12.7	1.27
63	0.05	12.6	1.26
50.5	0.04	12.6	1.26
50.5	0.04	12.6	1.26
37.5	0.03	12.5	1.25
37.5	0.03	12.5	1.25
24.5	0.02	12.3	1.23
25	0.02	12.5	1.25
12	0.01	12.0	1.20
12	0.01	12.0	1.20
			Avg
			Standard Dev
			1.25
			0.02

Seam Width Measurements (cont.)

- ❖ Measurement of one straw cut into four samples shows inconsistencies of the order of ~100 microns.



Straw 1			
Sample	Divisions	Microns	sigma (micron)
1	277.5	222	4
	260.5	208	3
	252	202	3
	240	192	3
	211.5	169	3
	203	162	3
2	253.5	203	3
	260	208	3
	270	216	4
	289	231	4
	284.5	228	4
	275	220	4
3	282	226	4
	265.5	212	3
	250	200	3
	287	230	4
	239.5	192	3
	230.5	184	3
4	222.5	178	3
	195	156	3
	181.5	145	2
	Average	199	25

Linear Density Measurements

- ❖ Calculated linear density $\lambda = M/L = 0.00335 \pm 0.00002$ g/cm (with varying density and thickness of Au and Al considered -- 10% variation of accepted Au-Al densities results in about 1% difference from ideal).

Length (cm)	sigma length (%)	Mass (g)	sigma mass (%)	Density (g/cm)	sigma density (%)	sigma density (g/cm)
3.0	1.667	0.01011	0.49	0.00337	2.16	0.0001
3.0	1.667	0.01025	0.49	0.00342	2.15	0.0001
3.0	1.667	0.01041	0.48	0.00347	2.15	0.0001
2.0	2.500	0.00708	0.71	0.00354	3.21	0.0001
2.0	2.500	0.00712	0.70	0.00356	3.20	0.0001
2.0	2.500	0.00696	0.72	0.00348	3.22	0.0001
1.0	5.000	0.00381	1.3	0.00381	6.3	0.0002
1.0	5.000	0.00371	1.4	0.00371	6.4	0.0002
1.0	5.000	0.00388	1.3	0.00388	6.3	0.0002
				Average	Standard Deviation	
				0.0036	0.0002	

- ❖ Biggest uncertainty is in the sample length. For 1 cm straw sample, one must know it's dimensions to 0.1 mm to detect a 10% change in the mylar/glue thickness. This scales directly with sample length, so longer samples (probably 10 cm -- which gives the allowed uncertainty to be 1 mm) will be used in the future.