Small group Mott meeting

4 February 2016

Recent work

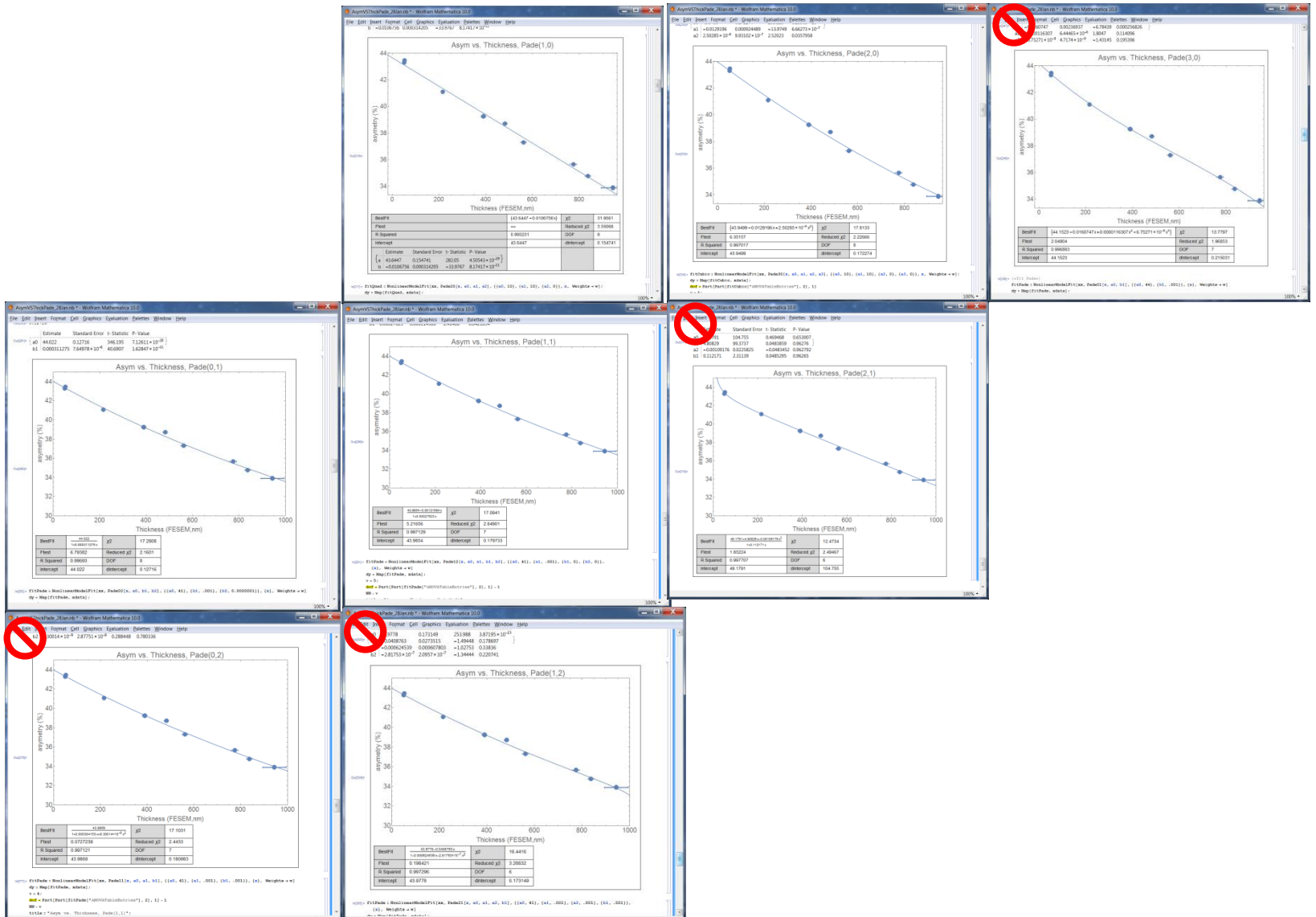
- First, write up thickness measurement section, refine error bars on data very slightly to avoid double counting
- Second, the small $\chi 2$ imply overestimated error bars. Do we really need the 2% foil uniformity and 5% batch uniformity specs?
- Third, churn through the Run 2 data vs. thickness using original error bars.
- Fourth, do we need to talk about the linear fit lopping off points at the end?

		Au_5385_B	Au_3057_C	Au_5134_B	Au_7028_B	Au_5275_C	Au_5613_D	Au_7029_B	Au_6809_B
	nominal thickness (nm)	*1000*	*870*	*750*	*625*	*500*	*355*	*225*	*50*
	mean thickness (all data, nm)	**943.7**	**836.8**	**774.6**	**561.2**	**482.0**	**389.4**	**215.2**	**52.0**
Stat.	Stdev, nom. identical data (nm)	29.0	7.1	9.1	8.0	9.7	4.5	1.9	2.3
	stdev image reanalysis (nm)	22.5	7.7	9.4	7.5	4.0	2.7	1.8	2.1
Syst.	Image analysis: ± 4 Pixel	20.0	8.0	10.0	8.0	8.0	8.0	2.6	2.6
	Resolution (1.2 nm inherent)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	Tilt (0.4%)	4.6	4.2	3.9	2.8	2.5	1.9	1.1	0.3
	Focus (1%)	9.4	8.4	7.7	5.6	4.8	3.9	2.2	0.5
	Different spots (Lebow: 2%)	18.9	16.7	15.5	11.2	9.6	7.8	4.3	1.0
	Sibling difference (Lebow:5%)	47.2	41.8	38.7	28.1	24.1	19.5	10.8	2.6
Totals									
	stat uncertainty (nm)	36.7	10.5	13.1	11.0	10.5	5.2	2.6	3.1
	syst uncertainty (nm)	55.6	46.7	43.8	31.9	27.7	22.9	12.2	4.1
	total uncertainty (nm)	**66.6**	**47.9**	**45.7**	**33.7**	**29.6**	**23.5**	**12.5**	**5.1**

Pade(n,m) orders: Asy vs. Thick
With both Lebow Uncertainties

Pade(n,m)	intercept	dA	R^2	red. χ^2	d.o.f.	Conf	Ftest
(1,0)	43.8025	0.1169	0.991	1.28	9	<50?	--
(2,0)	44.0176	0.1018	0.997	0.594	8	>70	11.45
(3,0)	~~44.1777~~	0.128	0.997	0.546	7	~80	3.15 (rej F test)
(0,1)	44.0382	0.0786	0.997	.554	8	>80	11.23
(0,2)	~~44.0484~~	0.1057	0.997	0.737	7	>60	0.022 (rej ftest)
(1,1)	44.049	0.1061	0.997	0.737	7	>60	9.67
(1,2)	~~44.0295~~	0.0986	0.997	0.870	6	>50	0.083 (rej. Ftest)
(2,1)	~~45.0432~~	4.014	0.9977	0.6104	6	>70	2.25 (rej. Ftest)

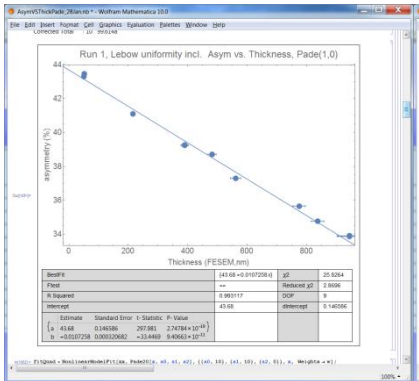
Both 5% batch and 2% uniformity Lebow uncertainties not included

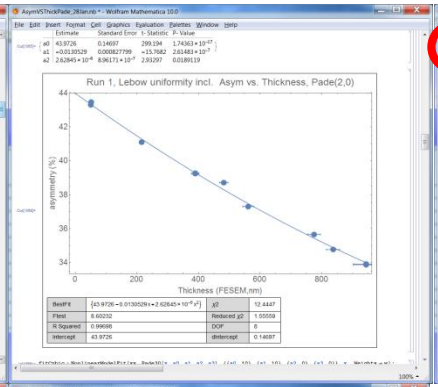


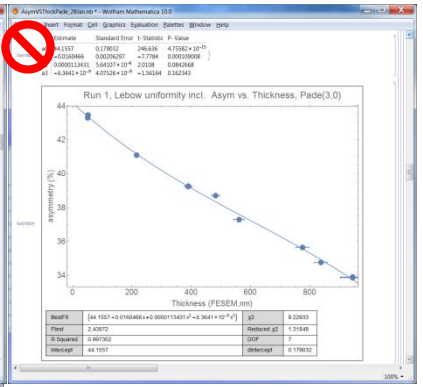
Pade(n,m) orders: Asy vs. Thick, both systematic Lebow removed

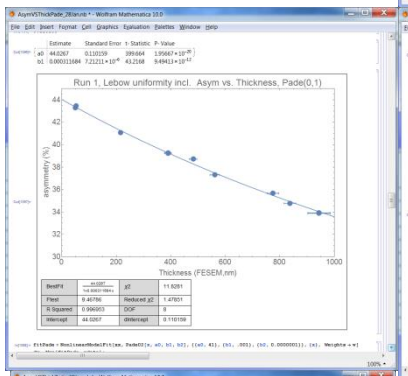
Pade(n,m)	intercept	dA	R^2	red. χ^2	d.o.f.	Conf.	Ftest
(1,0)	43.645	.155	0.993	3.55	9		--
(2,0)	43.95	.172	0.997	2.23	8		6.35
(3,0)	44.1523	.215	0.997	1.97	7		2.05
(0,1)	44.022	0.127	0.997	2.16	7		6.79
(0,2)	43.987	0.181	.997	2.44	7		.07
(1,1)	43.9854	0.180	.997	2.85	7		5.22
(1,2)	43.9778	0.173	.997	3.29	6		.198
(2,1)	49.1791	104	.998	2.49	6		1.85

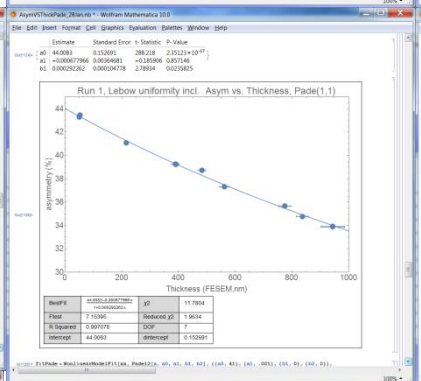
Only 2% uniformity spec from Lebow included

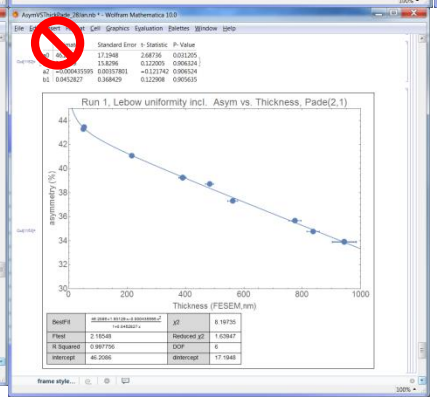


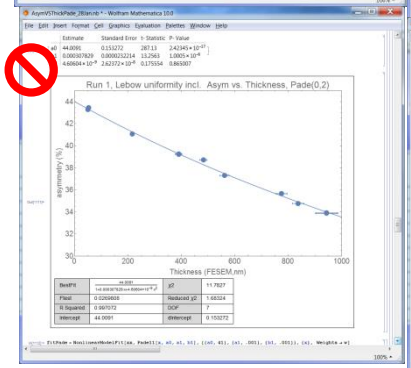


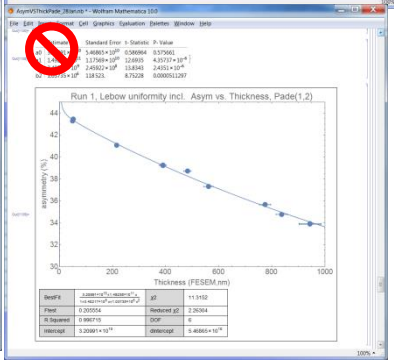








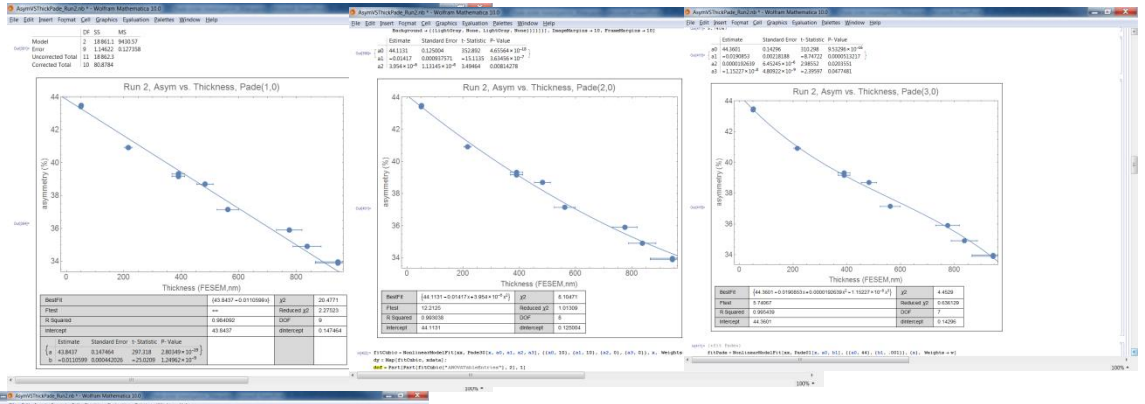


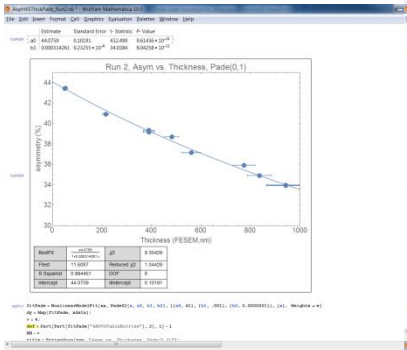


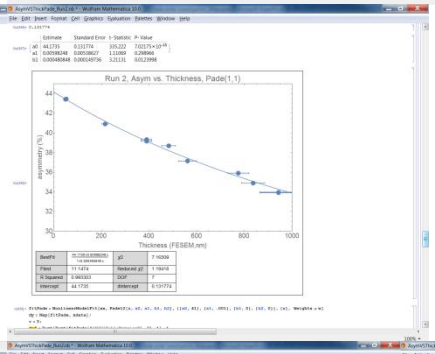
Pade(n,m) orders: Asy vs. Thick
With both only 2% Lebow Uncertainty

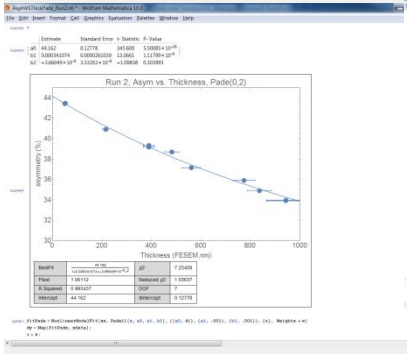
Pade(n,m)	intercept	dA	R^2	red. χ^2	d.o.f.	Conf	Ftest
(1,0)	43.68	.147	.993	2.87	9		--
(2,0)	43.97	.147	.997	1.56	8		8.60
(3,0)	44.156	.179	.997	1.32	7		2.43
(0,1)	44.027	0.110	.997	1.48	8		9.47
(0,2)	44.009	.153	.997	1.68	7		0.027
(1,1)	44.008	.153	.997	1.96	7		7.15
(1,2)	3e10	5e10	.997	2.26	6		.205
(2,1)	46.21	17.2	.998	1.64	6		2.18

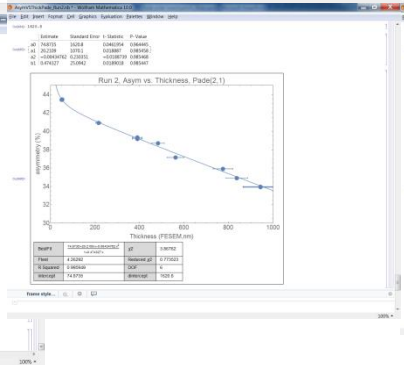
Run two data: Pade terms

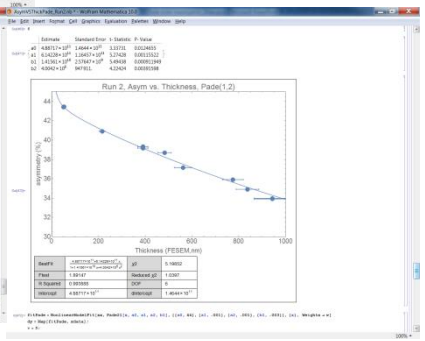












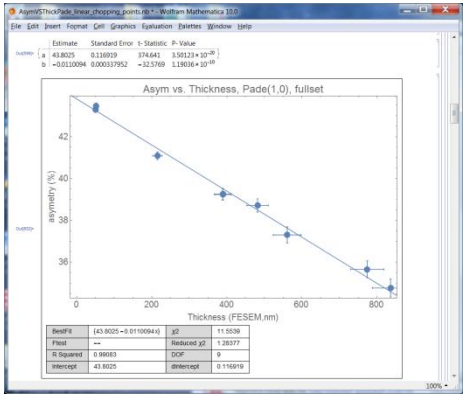
Run 1 Pade(n,m) orders: Asy vs. Thick

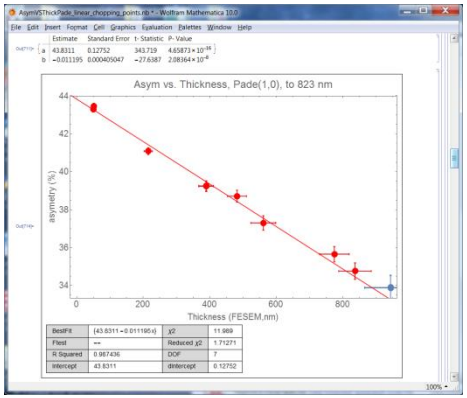
Pade(n,m)	intercept	dA	R^2	red. χ^2	d.o.f.	Ftest
(1,0)	43.8025	0.1169	0.991	1.28	9	--
(2,0)	44.0176	0.1018	0.997	0.594	8	11.45
(0,1)	44.0382	0.0786	0.997	.554	8	11.23
(1,1)	44.049	0.1061	0.997	0.737	7	9.67

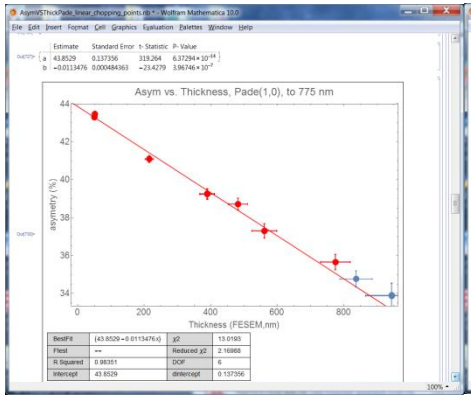
Run 2 Pade(n,m) orders: Asy vs. Thick

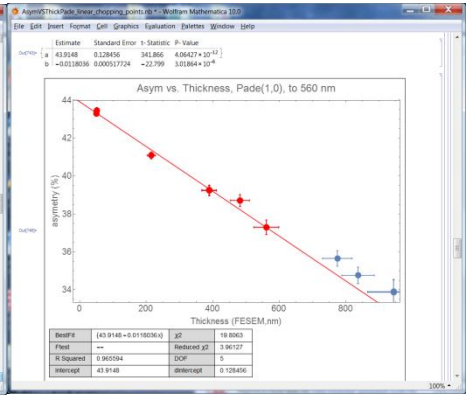
Pade(n,m)	intercept	dA	R^2	red. χ^2	d.o.f.	Ftest
(1,0)	43.8437	0.1475	.984	2.28	9	--
(2,0)	44.1131	0.125	.993	1.01	8	12.21
(0,1)	44.0759	0.102	.994	1.04	8	11.61
(1,1)	44.1735	0.132	.993	1.19	7	9.67

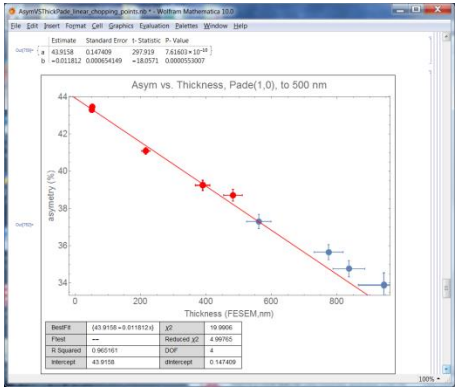
Linear fit: how many points?

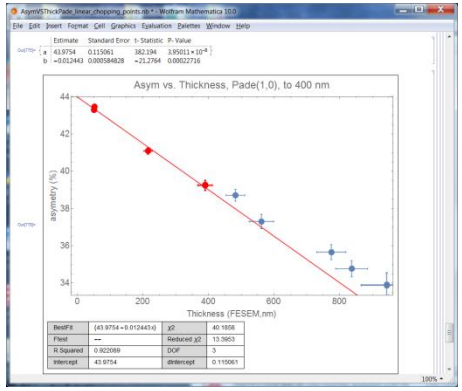












Points kept (of 11)	Asym	dA
5	43.9754	0.115
6	43.916	0.147
7	43.915	0.128
8	43.853	0.137
9	43.833	0.128
all	43.803	0.117