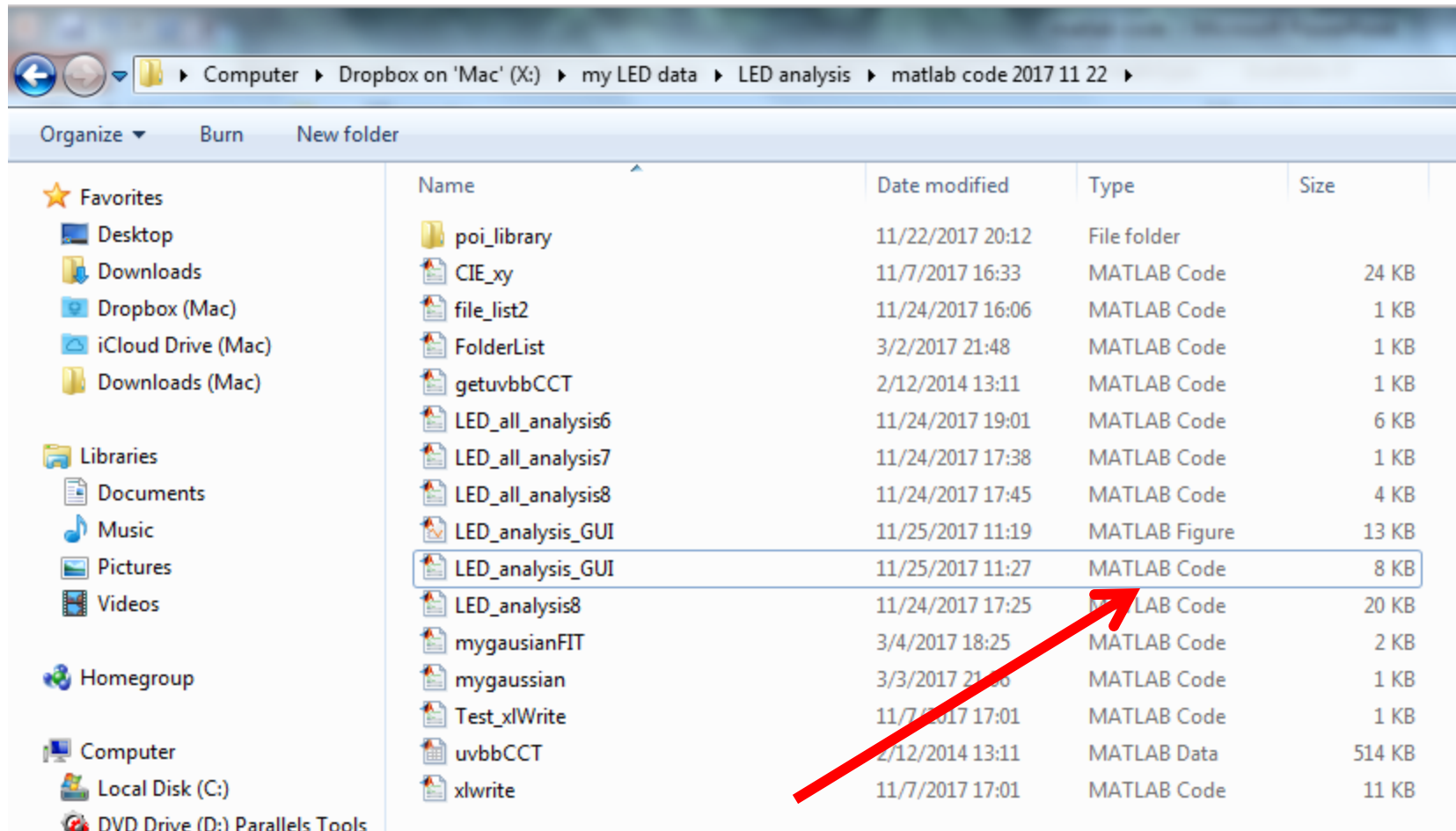


# **Matlab Analysis Code**

## **2017 11 22 update**

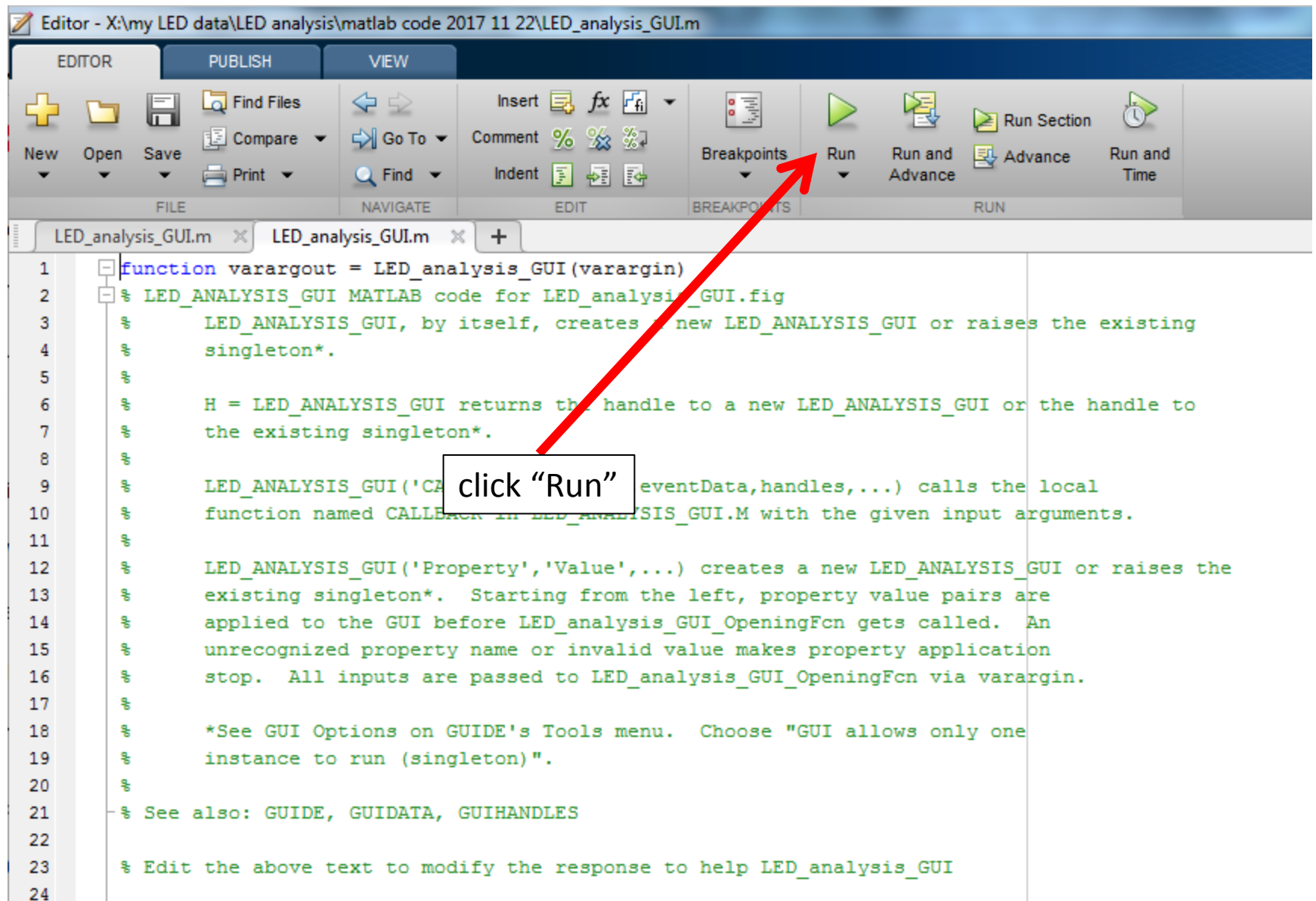
# Open the folder with the source code.



Double click “LED\_analysis\_GUI.m”  
Choose the MATLAB CODE, not MATLAB FIGURE.

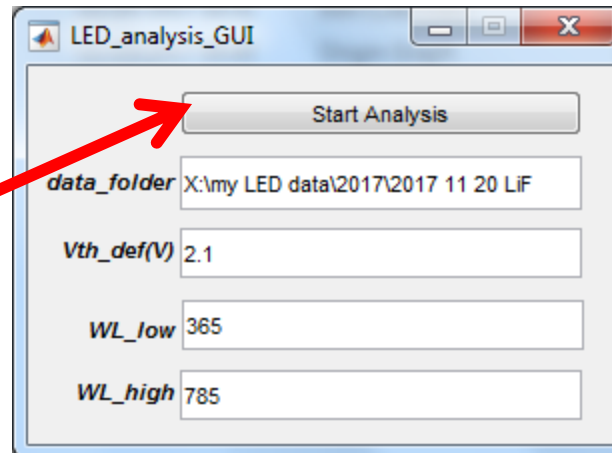
Note: Do not delete any other files from the folder.

# Go to the EDITOR



# Simple User Interface

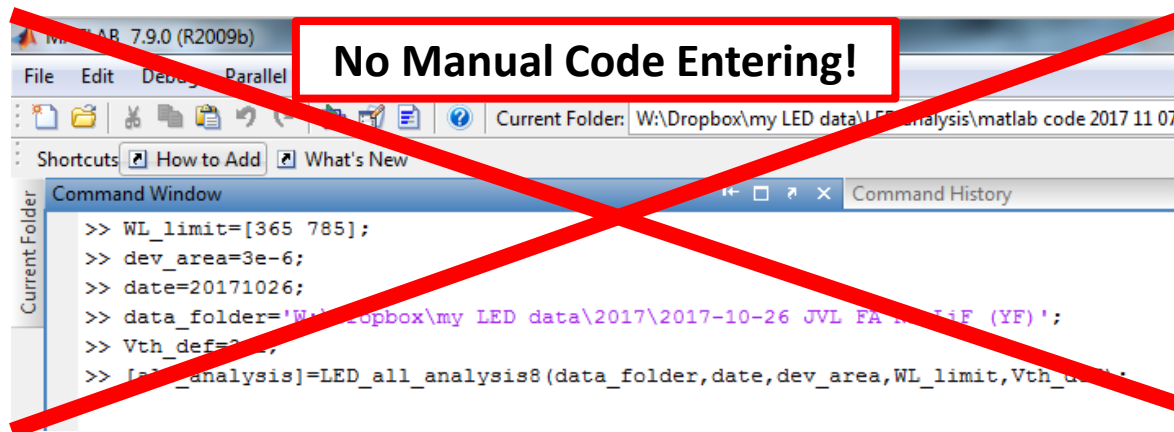
Click to begin analysis



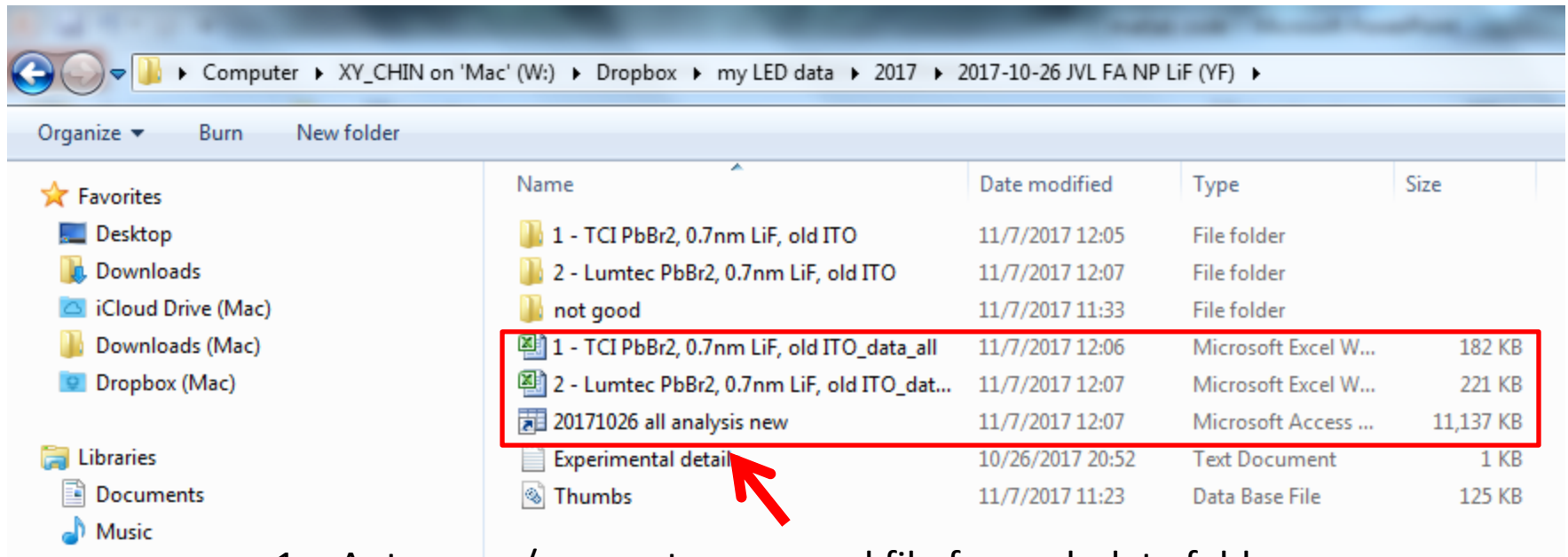
Key in parameters:

1. Full address of data folder
2. a dummy parameter to ignore any data below  $V = V_{th\_def}$
3. Lower wavelength limit for EQE calculation
4. Upper wavelength limit for EQE calculation

No requirement to key “date” and “dev\_area”: updated code to extract from meta file automatically



## After the code finished running.



1. Auto-save / generate one excel file for each data folder
2. Auto-save/ generate matlab workspace file

# Excel Files

1 - TCI PbBr<sub>2</sub>, 0.7nm LiF, old ITO\_data\_all - Microsoft Excel

FileHomeInsertPage LayoutFormulasDataReviewViewAdd-Ins

<

- 8 data sheets with different information

# Excel: sheet 1

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Voltage (V	Current (A	Current D	Current D	Luminous	Luminanc	Current Ef	Luminous	EQE (%)	wall plug	Voltage (V	Current (A	Current D	Current D	Luminous	Lumin
2	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	
3	175459	175459	175459	175459	175459	175459	175459	175459	175459	175459	175642	175642	175642	175642	175642	1756
4	-1.1	-6.8E-08	-0.00228	0.002277	-6.7E-06	-2.2464	98.672	-281.807	96.0247	0.000596	-1.1	-6.1E-08	-0.00205	0.002047	-2.7E-07	-0.08
5	-1	-5.2E-08	-0.00172	0.001723	-8.8E-06	-2.9343	170.2669	-534.909	125.3692	0.000846	-1	-4.7E-08	-0.00155	0.00155	8.11E-07	0.270
6	-0.9	-4.2E-08	-0.00141	0.001413	-6.3E-06	-2.0849	147.5142	-514.922	123.1991	0.000949	-0.9	-3.9E-08	-0.00129	0.00129	7.15E-07	0.23
7	-0.8	-3.5E-08	-0.00116	0.001163	-7.4E-06	-2.4798	213.1605	-837.079	174.7643	0.001532	-0.8	-3.2E-08	-0.00107	0.00107	6E-07	0.200
8	-0.7	-2.8E-08	-0.00095	0.000947	-7.3E-06	-2.4416	257.9155	-1157.52	227.2297	0.002336	-0.7	-2.6E-08	-0.00088	0.00088	1.18E-06	0.3
9	-0.6	-2.3E-08	-0.00075	0.00075	-7.7E-06	-2.5545	340.6044	-1783.4	315.8942	0.003653	-0.6	-2.1E-08	-0.00071	0.000713	1.28E-06	0.42
10	-0.5	-1.7E-08	-0.00057	0.000573	-6.6E-06	-2.2106	385.5698	-2422.61	387.4331	0.005122	-0.5	-1.7E-08	-0.00056	0.00056	1.1E-06	0.366
11	-0.4	-1.2E-08	-0.00041	0.000413	-8E-06	-2.6599	643.5242	-5054.23	576.1644	0.009266	-0.4	-1.3E-08	-0.00042	0.000423	1.7E-06	0.565
12	-0.3	-8E-09	-0.00027	0.000267	-7.8E-06	-2.5842	969.075	-10148.1	782.1829	0.017258	-0.3	-8.8E-09	-0.00029	0.000293	1.24E-06	0.41
13	-0.2	-4.2E-09	-0.00014	0.00014	-7.9E-06	-2.6299	1878.476	-29507	1573.339	0.051548	-0.2	-5.1E-09	-0.00017	0.00017	-1.3E-06	-0.43
14	-0.1	-6E-10	-0.00002	0.00002	-6.4E-06	-2.1285	10642.5	-334344	10603.63	0.74533	-0.1	-1.4E-09	-4.7E-05	4.67E-05	1.24E-06	0.413
15	0	2.7E-09	0.00009	0.00009	-8.1E-06	-2.6953	-2994.81	-Inf	-2279.84	Inf	0	2.5E-09	8.33E-05	8.33E-05	1.74E-07	0.0580
16	0.1	6E-09	0.0002	0.0002	-7.8E-06	-2.5879	-1293.93	-40650.1	-1040.48	0.0714	0.1	6.5E-09	0.000217	0.000217	1.13E-06	0.37
17	0.2	9.4E-09	0.000313	0.000313	-8.2E-06	-2.7249	-869.649	-13660.4	-645.503	0.022202	0.2	1.08E-08	0.00036	0.00036	1.29E-06	0.431
18	0.3	1.3E-08	0.000433	0.000433	-7.3E-06	-2.4235	-559.269	-5856.65	-499.596	0.011482	0.3	1.53E-08	0.00051	0.00051	5.9E-07	0.19
19	0.4	1.7E-08	0.000567	0.000567	-8.4E-06	-2.8145	-496.671	-3900.84	-369.55	0.006181	0.4	1.99E-08	0.000663	0.000663	5.98E-08	0.0195
20	0.5	2.15E-08	0.000717	0.000717	-7.3E-06	-2.4282	-338.823	-2128.89	-290.61	0.003891	0.5	2.53E-08	0.000843	0.000843	8.13E-07	0.271
21	0.6	2.66E-08	0.000887	0.000887	-7.9E-06	-2.6184	-295.305	-1546.21	-249.002	0.002929	0.6	3.07E-08	0.001023	0.001023	6.12E-07	0.203
22	0.7	3.22E-08	0.001073	0.001073	-8.8E-06	-2.9295	-272.932	-1224.91	-218.704	0.002213	0.7	3.65E-08	0.001217	0.001217	-7.9E-07	-0.263

- First row: header with unit
  - Second row: index of device
  - Third row: time of measurement
  - Fourth row onwards: data...
1. Voltage
  2. Current
  3. Current density
  4. Absolute value of Current density
  5. Candela
  6. Luminance
  7. C.E.
  8. L.P.E.
  9. EQE
  10. Wall plug efficiency

## Excel: sheet 2

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	number	time	V1 (V)	Jth1 (mA/	Max Lum (	V @ Max I	Max C.E. (c	V @ Max C	Max L.P.E. V	@ Max I	Jrev	Max EQE	V @ Max EQ
2	1	175459	2.4	0.20367	34513.69	5.8	27.4924	4	22.7956	3.6	-0.00172	6.4747	4
3	2	175642	2.3	0.086523	30822.68	5.9	31.5488	3.9	26.8701	3.5	-0.00155	7.4326	3.9
4	3	175748	2.4	0.17202	31251.97	5.8	29.5692	3.9	24.9601	3.5	-0.00171	6.9656	3.9
5	4	175853	2.3	0.070373	27650.77	5.8	33.0872	3.9	28.5034	3.5	-0.00211	7.8004	3.9
6	5	175948	2.3	0.08184	30276.05	5.8	32.3732	3.9	27.6954	3.5	-0.00208	7.6299	3.9

Summary of data:

1. Index of device
2. Time of measurement
3. Turn-on voltage
4. Turn-on current
5. Max Luminance
6. V@ Max Luminance
7. Max C.E.
8. V@ Max C.E.
9. Max L.P.E.
10. V@ Max L.P.E.
11. Reverse current density
12. Max EQE
13. V@ Max EQE



# Excel: sheet 3

	A	B	C	D	E	F	G	H	I	J	K	
1	Wavelength	Counts	Absolute	Normalized	Wavelength	Counts	Absolute	Normalized	Wavelength	Counts	Absolute	Normalized
2	1	1	1	1	2	2	2	2	3	3	3	3
3	175459	175459	175459	175459	175642	175642	175642	175642	175748	175748	175748	175748
4	365.2039	19	2.99E-08	0.000451	365.2039	22	2.99E-08	0.000506	365.2039	18	2E-08	0.000303
5	365.9912	13	1.65E-08	0.000248	365.9912	14	2.96E-08	0.000501	365.9912	13	1.65E-08	0.000248
6	366.7784	16	1.63E-08	0.000246	366.7784	19	1.96E-08	0.000331	366.7784	20	2.93E-08	0.000442
7	367.5656	12	2.26E-08	0.00034	367.5656	10	6.45E-09	0.000109	367.5656	16	2.26E-08	0.00034
8	368.3527	15	1.59E-08	0.00024	368.3527	17	2.87E-08	0.000484	368.3527	14	1.59E-08	0.00024
9	369.1398	22	3.15E-08	0.000474	369.1398	19	1.57E-08	0.000266	369.1398	18	6.29E-09	0.000109
10	369.9268	16	2.48E-08	0.000375	369.9268	14	1.24E-08	0.00021	369.9268	15	2.79E-08	0.000424
11	370.7137	13	2.45E-08	0.00037	370.7137	16	3.06E-08	0.000518	370.7137	14	2.15E-08	0.000325
12	371.5006	13	8.07E-09	0.000137	371.5006	14	1.21E-08	0.000204	371.5006	15	3.33E-08	0.000518

## Spectrum @ Max Luminance

- First row: header with unit
  - Second row: index of device
  - Third row: time of measurement
  - Fourth row onwards: data...
1. Wavelength
  2. Counts
  3. Absolute Irradiance
  4. Normalized Absolute Irradiance

# Excel: sheet 4

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	number	time	V100 (V)	Jden100 (n	Lum100 (c	EQE100 (%)	CE100 (cd	LPE100 (ln	V1000 (V)	Jden100(n	Lum1000(i	EQE1000 (	CE1000 (cc	LPE1000 (ln
2	1	175459	2.8	1.2557	147.7684	2.6488	11.7682	13.2038	3.3	6.0314	1369.015	5.3126	22.6981	21.6086
3	2	175642	2.8	0.97199	152.5768	3.7134	15.6974	17.6124	3.3	4.7855	1317.909	6.4749	27.5393	26.2174
4	3	175748	2.8	1.0832	152.0076	3.2511	14.0336	15.7457	3.3	5.2571	1335.628	5.9738	25.4062	24.1867
5	4	175853	2.8	0.78424	136.5173	4.056	17.4076	19.5313	3.3	3.886	1148.744	6.9498	29.5615	28.1424
6	5	175948	2.8	0.88641	147.045	3.9423	16.5889	18.6127	3.3	4.345	1232.819	6.6737	28.3732	27.0112

Summary of data:

At 100 and 1000 cd/m<sup>2</sup>

1. Voltage
2. Current Density
3. 1<sup>st</sup> Luminance >= 100 (or 1000) cd/m<sup>2</sup>
4. EQE
5. C.E.
6. L.P.E.

# Excel: sheet 5

	A	B	C	D	E	F	G	H	I	J	K
1	number	time	CIE31_x	CIE31_y	CIE31_X	CIE31_Y	CIE31_Z	CIE60_u	CIE60_v	color corr	duv
2	1	175459	0.18664	0.76158	0.000368	0.001503	0.000102	0.063452	0.38837	7408	0.15725
3	2	175642	0.18698	0.76132	0.00033	0.001342	9.11E-05	0.063588	0.38837	7404	0.15713
4	3	175748	0.18725	0.76137	0.000335	0.001361	9.18E-05	0.06368	0.38839	7400	0.15707
5	4	175853	0.18727	0.76136	0.000296	0.001204	8.12E-05	0.063686	0.38839	7399	0.15706
6	5	175948	0.18719	0.76146	0.000324	0.001318	8.89E-05	0.063652	0.3884	7400	0.15709

Summary of data:

At Max Luminance:

1. CIE 1931 (x,y)
2. CIE 1931 (X,Y,Z) (unnormalized)
3. CIE 1960 (u,v)
4. Color correlated temperature (CCT)
5. duv: "distance" to ideal black body source @ CCT

# Excel: sheet 6

	A	B	C	D	E	F	G	H	I	J
1	number	time	Amp	Amp Std E	Peak Pos	Peak Pos	FWHM (nr	FWHM Stc	R2	Traced Peak
2	1	175459	6.3E-05	3.18E-07	529.8928	0.063127	25.5606	0.14865	0.99291	529.8899
3	2	175642	5.63E-05	2.82E-07	529.9451	0.062859	25.5636	0.14802	0.99298	529.1164
4	3	175748	5.71E-05	2.88E-07	529.9835	0.062997	25.498	0.14835	0.99291	529.1164
5	4	175853	5.06E-05	2.55E-07	530.0042	0.063009	25.489	0.14837	0.9929	529.8899
6	5	175948	5.54E-05	2.79E-07	529.9909	0.062927	25.4719	0.14818	0.99291	529.8899

Summary of data:

At Max Luminance:

1. Amplitude + error of fitting
2. FWHM + error
3. Peak position + error
4.  $R^2$  of the fitting
5. Maximum of original data

Note: fitted with single gaussian peak

$$y = \text{Amp} * \exp(-(4 * \log(2)) * ((xdata - X) / (\text{FWHM}))^2);$$

# Excel: sheet 7

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Voltage (V)	Current Density (A/m²)	Luminance (cd/m²)	CIE31_x	CIE31_y	CIE31_X	CIE31_Y	CIE31_Z	CIE60_u	CIE60_v	color correlated temp (K)	duv	Voltage (V)	Current Density (A/m²)	Luminance (cd/m²)	CIE31_x
2	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	
3	175459	175459	175459	175459	175459	175459	175459	175459	175459	175459	175459	175459	175642	175642	175642	175642
4	-1.1	0.002277	-2.2464	0.28217	0.25512	-1.1E-07	-1E-07	-1.8E-07	0.20532	0.27846	12949	0.019727	-1.1	0.002047	-0.0884	0.3341
5	-1	0.001723	-2.9343	0.30691	0.29698	-1.3E-07	-1.2E-07	-1.7E-07	0.20633	0.29948	7266	0.011013	-1	0.00155	0.27033	0.3200
6	-0.9	0.001413	-2.0849	0.26396	0.27662	-8.8E-08	-9.2E-08	-1.5E-07	0.18231	0.28658	13450	0.004659	-0.9	0.00129	0.2383	0.3521
7	-0.8	0.001163	-2.4798	0.30443	0.29169	-1.1E-07	-1.1E-07	-1.5E-07	0.2067	0.29707	7574	0.012612	-0.8	0.00107	0.20003	0.2646
8	-0.7	0.000947	-2.4416	0.31582	0.24616	-1.2E-07	-9.6E-08	-1.7E-07	0.23736	0.2775	7746	0.048972	-0.7	0.00088	0.394	0.2606
9	-0.6	0.00075	-2.5545	0.31594	0.26135	-1.3E-07	-1.1E-07	-1.8E-07	0.2296	0.28489	7200	0.038477	-0.6	0.000713	0.4261	0.4378
10	-0.5	0.000573	-2.2106	0.25008	0.25636	-8.8E-08	-9E-08	-1.7E-07	0.1794	0.27584	23861	0.003867	-0.5	0.00056	0.36617	0.4161
11	-0.4	0.000413	-2.6599	0.30662	0.29147	-1.2E-07	-1.1E-07	-1.6E-07	0.20843	0.2972	7397	0.014013	-0.4	0.000423	0.56567	0.3143
12	-0.3	0.000267	-2.5842	0.29111	0.29505	-1.1E-07	-1.1E-07	-1.5E-07	0.19543	0.29711	8638	0.002832	-0.3	0.000293	0.4149	0.3774
13	-0.2	0.00014	-2.6299	0.2962	0.32136	-1E-07	-1.1E-07	-1.3E-07	0.18915	0.30782	7579	0.007973	-0.2	0.00017	-0.4173	3.775
14	-0.1	0.00002	-2.1285	0.30119	0.28517	-9.6E-08	-9E-08	-1.3E-07	0.20701	0.29401	8036	0.014454	-0.1	4.67E-05	0.41363	0.3555
15	0	0.00009	-2.6953	0.33344	0.31569	-1.2E-07	-1.2E-07	-1.3E-07	0.21788	0.30943	5436	0.014162	0	8.33E-05	0.058067	0.2596
16	0.1	0.0002	-2.5879	0.34105	0.31181	-1.2E-07	-1.1E-07	-1.3E-07	0.22513	0.30874	5025	0.019872	0.1	0.000217	0.3764	0.2182
17	0.2	0.000313	-2.7249	0.29504	0.27789	-1.3E-07	-1.2E-07	-1.8E-07	0.20544	0.29024	8942	0.014895	0.2	0.00036	0.43123	0.3761
18	0.3	0.000433	-2.4235	0.28627	0.25596	-1.2E-07	-1E-07	-1.9E-07	0.20823	0.27928	11976	0.022105	0.3	0.00051	0.1967	0.2395
19	0.4	0.000567	-2.8145	0.30382	0.30252	-1.2E-07	-1.2E-07	-1.6E-07	0.20179	0.30138	7397	0.00616	0.4	0.000663	0.019933	0.2600
20	0.5	0.000717	-2.4282	0.29439	0.28767	-1.1E-07	-1E-07	-1.5E-07	0.20084	0.29438	8600	0.008888	0.5	0.000843	0.27103	0.2500
21	0.6	0.000887	-2.6184	0.26828	0.25619	-1.2E-07	-1.1E-07	-2.1E-07	0.19378	0.27758	16315	0.009243	0.6	0.001023	0.20387	0.2292
22	0.7	0.001073	-2.9295	0.29842	0.26674	-1.4E-07	-1.2E-07	-2E-07	0.213	0.28559	9110	0.023756	0.7	0.001217	-0.26293	0.2484
23	0.8	0.00128	-2.5605	0.30938	0.33706	-1E-07	-1.1E-07	-1.2E-07	0.19258	0.31472	6620	0.008915	0.8	0.001437	-0.01423	0.2695

As a function of Voltage (Current density and Luminance also given):

1. CIE 1931 (x,y)
2. CIE 1931 (X,Y,Z) (unnormalized)
3. CIE 1960 (u,v)
4. Color correlated temperature (CCT)
5. duv: “distance” to ideal black body source @ CCT

# Excel: sheet 8

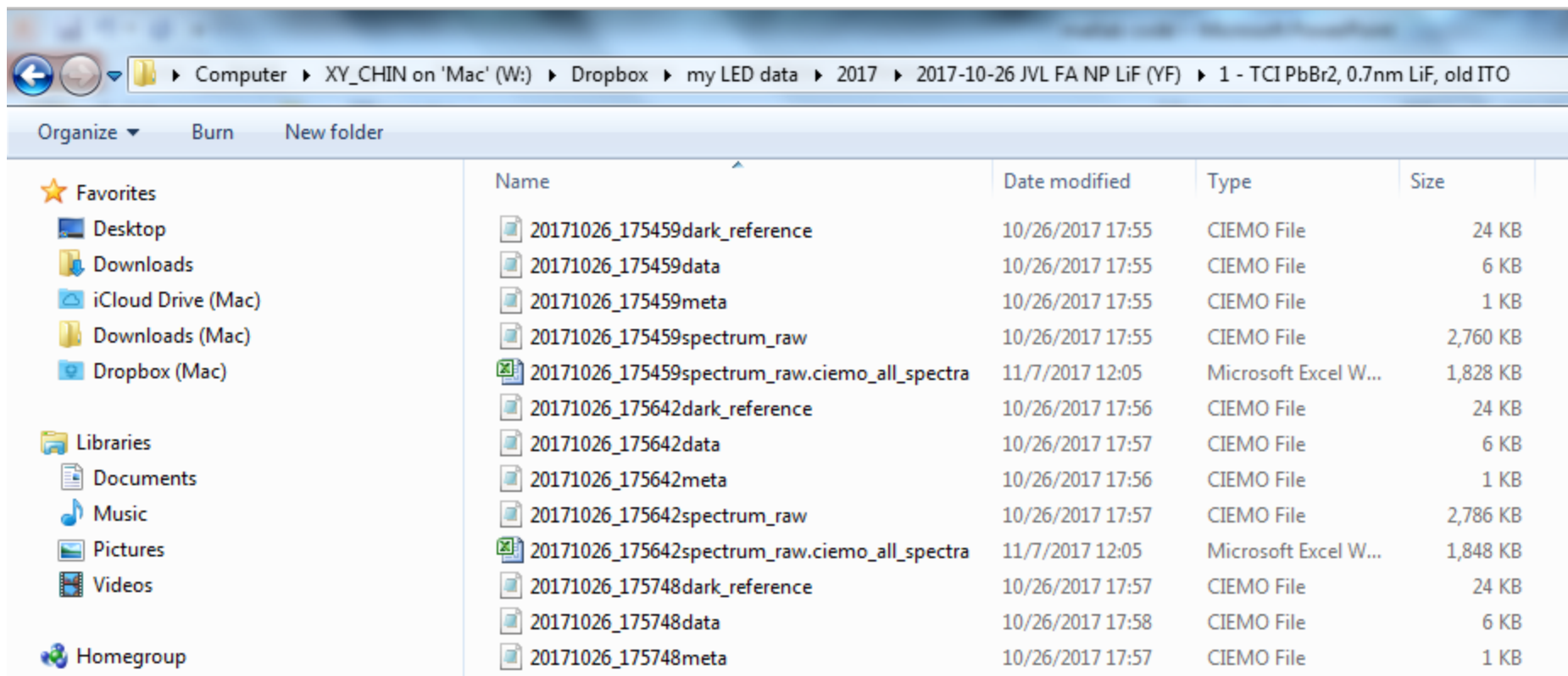
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Voltage (\	Current D	Luminanc	Amp	Amp Std E	Peak Pos	Peak Pos	FWHM	FWHM Stc	R2	Traced Pe	Voltage (\	Current D	Luminanc	Amp
2	1	1	1	1	1	1	1	1	1	1	1	2	2	2	
3	175459	175459	175459	175459	175459	175459	175459	175459	175459	175459	175459	175642	175642	175642	175
4	-1.1	0.002277	-2.2464	7.42E-09	2.02E-09	376.9496	1.335	10	3.149	0.16599	382.5101	-1.1	0.002047	-0.0884	6.27
5	-1	0.001723	-2.9343	8.69E-09	4.66E-09	365.2039	7.2732	10	10.9766	0.13948	373.8608	-1	0.00155	0.27033	6.22
6	-0.9	0.001413	-2.0849	6.13E-09	3.91E-09	365.2039	8.6606	10	13.0705	0.238	370.7137	-0.9	0.00129	0.2383	4.58
7	-0.8	0.001163	-2.4798	6.45E-09	4.13E-09	365.2039	8.6915	10	13.1171	0.24639	367.5656	-0.8	0.00107	0.20003	1
8	-0.7	0.000947	-2.4416	6.13E-09	1.93E-09	402.5495	1.5445	10	3.6369	0.13334	405.2758	-0.7	0.00088	0.394	7.24
9	-0.6	0.00075	-2.5545	7.35E-09	4.47E-09	365.2039	8.2514	10	12.4529	0.15376	373.0741	-0.6	0.000713	0.4261	1
10	-0.5	0.000573	-2.2106	8.69E-09	2.31E-09	375.5463	1.3049	10	3.0942	0.077999	373.8608	-0.5	0.00056	0.36617	7.63
11	-0.4	0.000413	-2.6599	6.54E-09	2.08E-09	380.5019	1.5628	10	3.6802	0.14546	379.3658	-0.4	0.000423	0.56567	8.24
12	-0.3	0.000267	-2.5842	1.59E-08	5.48E-09	365.2039	4.6655	10	7.0411	-0.09597	373.8608	-0.3	0.000293	0.4149	8.57
13	-0.2	0.00014	-2.6299	7.04E-09	2.02E-09	380.0879	1.4075	10	3.3144	0.1824	385.6534	-0.2	0.00017	-0.4173	8.78
14	-0.1	0.00002	-2.1285	1.01E-08	4.77E-09	365.2039	6.3844	10	9.6352	0.090834	373.8608	-0.1	4.67E-05	0.41363	7.24
15	0	0.00009	-2.6953	1.01E-08	4.26E-09	365.2039	5.6938	10	8.593	0.19084	373.8608	0	8.33E-05	0.058067	8.78
16	0.1	0.0002	-2.5879	7.96E-09	2.02E-09	402.9031	1.242	10	2.9247	0.1235	404.4917	0.1	0.000217	0.3764	1.13
17	0.2	0.000313	-2.7249	5.63E-09	2.03E-09	378.6974	1.7702	10	4.1693	0.19628	375.434	0.2	0.00036	0.43123	7.32
18	0.3	0.000433	-2.4235	1.02E-08	2.32E-09	387.4341	1.1167	10	2.6297	0.080214	388.0102	0.3	0.00051	0.1967	7.45
19	0.4	0.000567	-2.8145	7.9E-09	1.97E-09	424.4443	1.2251	10	2.885	0.068832	413.897	0.4	0.000663	0.019933	1
20	0.5	0.000717	-2.4282	7.11E-09	1.88E-09	403.571	1.2975	10	3.0554	0.12612	413.897	0.5	0.000843	0.27103	8.57

As a function of Voltage (Current density and Luminance also given):

1. Amplitude + error of fitting
2. FWHM + error
3. Peak position + error
4.  $R^2$  of the fitting
5. Maximum of original data

Note: fitted with single gaussian peak

**Also generate/auto-save a “spectra” excel file for each measurement**  
**Each contains 4 data sheet**



## Spectra files

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	0	-1.1	-1	-0.9	-0.8	-0.7	-0.6	-0.5	-0.4	-0.3	-0.2	-0.1	0	0.1	0.2	0.3
2	0	0.002277	0.001723	0.001413	0.001163	0.000947	0.00075	0.000573	0.000413	0.000267	0.00014	0.00002	0.00009	0.0002	0.000313	0.000433
3	0	-2.24643	-2.93427	-2.08487	-2.47977	-2.4416	-2.55453	-2.2106	-2.6599	-2.5842	-2.62987	-2.1285	-2.69533	-2.58787	-2.7249	-2.4235
4	365.2039	-0.22402	0.765427	-0.2713	0.515723	0.271342	0.226308	0.191357	-0.25438	0.208753	-0.47219	0.49206	0.16402	0.417801	0.295525	0.32704
5	365.9912	-0.88752	-0.94766	-0.26871	0	-0.53751	-0.4483	-0.94766	-1.00781	-0.20676	-0.70153	-0.32491	-0.16246	-0.62072	-1.17082	-0.48588
6	366.7784	-0.43925	0.562811	-0.26598	-0.2528	-0.26602	-0.44374	-0.1876	-1.24695	-0.30699	-0.23147	-0.1608	-0.1608	-0.61441	-1.44864	0.480938
7	367.5656	0.868755	0.742091	-0.26303	1	0.789207	0.219409	0.371046	0	0.202389	0.228899	0.318039	0.477059	0.202532	0.859544	0.634138
8	368.3527	0.429077	-0.73304	0.779459	-0.4939	0	-0.6502	-1.28281	-0.97446	-0.4998	-0.22611	-0.94248	0.157079	-0.40012	-0.84906	-0.6264
9	369.1398	-0.42384	-0.72409	0.256649	0.243936	-0.25669	-0.42817	0	-0.48129	-0.29622	0	-0.15516	-0.15516	0.197619	0.279565	-0.77345
10	369.9268	0	-0.35737	-0.25333	0.722347	-0.50674	0.211319	-0.35737	0.237532	-0.19493	-0.66138	-0.30631	0.306313	-0.39013	-1.1038	0.152689
11	370.7137	0.619291	0.881665	1	0.475233	0.500076	-0.20854	0.881665	-0.46882	0.096182	-0.65268	0.453428	0.453428	0.769997	0	0.301363
12	371.5006	-0.40722	-0.6957	-0.24658	-0.23437	-0.98649	-0.82277	-0.34785	-1.15603	-0.85381	-0.21459	-0.44723	-0.44723	-0.75948	-0.80581	-0.89174
13	372.2874	0	-0.1715	-0.4863	-0.92442	-0.72956	-0.60848	-0.343	-0.91194	0.093546	0.211598	-0.441	0	0.374448	-0.26486	0.146552
14	373.0741	-0.98988	0	0.479523	-0.68366	0	1	0	-0.22481	0	0.208651	-0.72476	-0.28991	-0.55385	0.522339	0
15	373.8608	0.585342	1	-0.2363	0.224591	0	0.197109	1	-0.22156	1	0.822536	1	1	0.363894	0.514788	0
16	374.6474	0.19234	-0.32859	0.232935	-0.44279	-0.23297	-0.58292	-0.49289	-0.65522	-0.08962	-0.20271	-0.14083	0	-0.35872	-0.7612	-0.28079

- First row: voltage
- Second row: current density
- Third row: Luminance
- First Column: wavelength
- The rest: abs. irradiance

## 4 data sheet:

Sheet 1: interpolated data (WL step of 1nm)

Sheet 2: original data

Sheet 3: Normalized data of Sheet 1

Sheet 4: Normalized data of Sheet 2



# If you have Matlab.....

Organized according to folder

The screenshot displays the MATLAB Variable Editor and Workspace. The Variable Editor shows a 4x10 cell array named 'all\_analysis'. A red box highlights the first four rows of this array, and a red arrow points to the second column, which contains folder names. The Workspace shows the 'all\_analysis' variable as a 4x10 cell array, with a red arrow pointing to its entry.

	1	2	3	4	5	6	7	8	9	10
1	0	'folder'	'data_all'	'par00'	'spectra'	'par11'	'par22'	'par33'	'data_color_...'	'data_peak_...'
2	1	'1 - TCI PbB...	<81x50 cell>	<6x14 cell>	<551x20 cell>	<6x14 cell>	<6x11 cell>	<6x10 cell>	<81x60 cell>	<81x55 cell>
3	2	'2 - Lumtec ...'	<81x50 cell>	<6x14 cell>	<551x20 cell>	<6x14 cell>	<6x11 cell>	<6x10 cell>	<81x60 cell>	<81x55 cell>
4	3	'not good'	0	0	0	0	0	0	0	0
5										
6										
7										
8										

Name	Value	Min	Max
Vth_def	2.1000	2.1000	2.1000
WL_limit	[365,785]	365	785
all_analysis	<4x10 cell>		
data_folder	'W:\Dropbox\my LED data\2017\2017-10-26 JVL FA NP LiF (YF)'		
date	20171026	20171026	20171026
dev_area	3.0000e-06	3.0000e-06	3.0000e-06

"all\_analysis" contains all of the data