

Ellipsometry Batch Inspection Report

Prepared By: Max Junda, PhD (max.junda@covalentmetrology.com)

Reviewed By: Avery Green, PhD (avery@covalentmetrology.com)

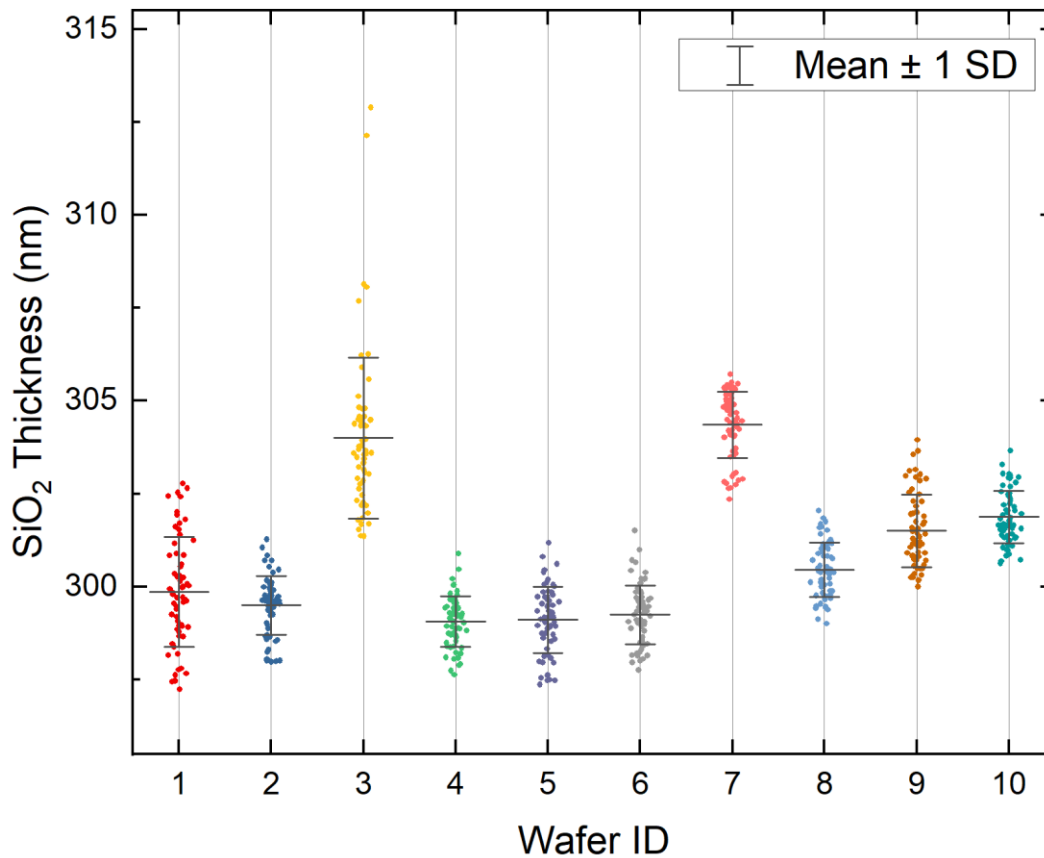
Analysis Goals

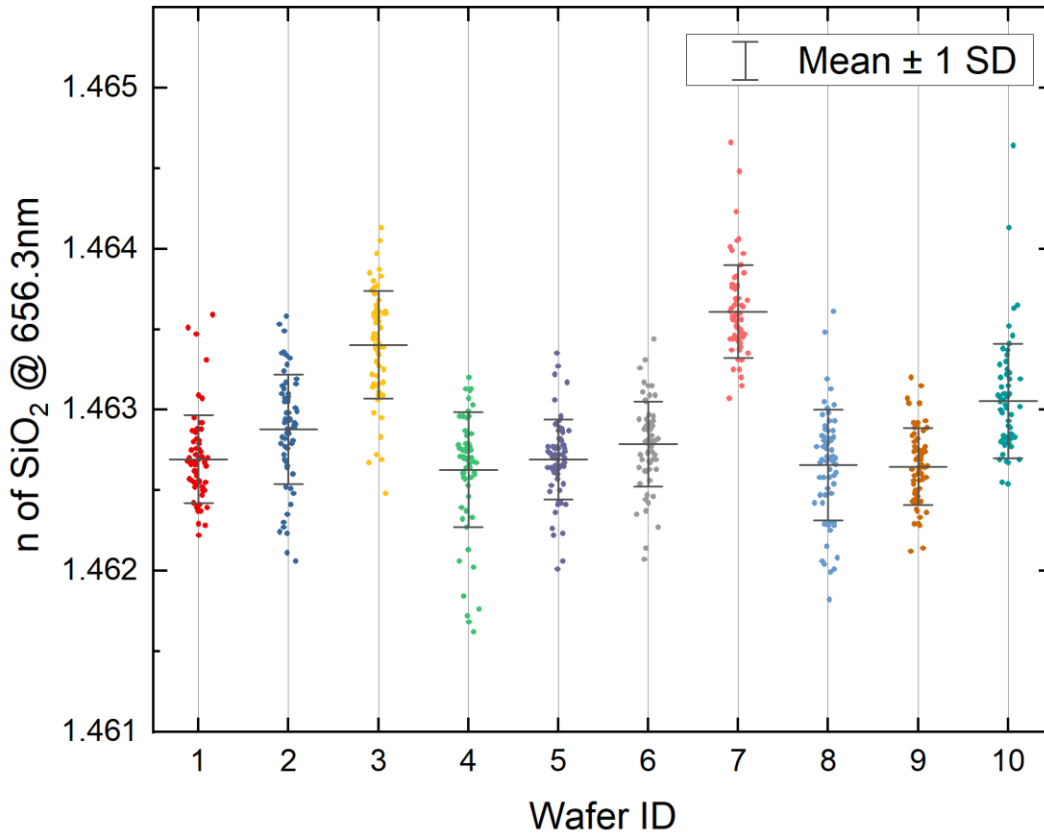
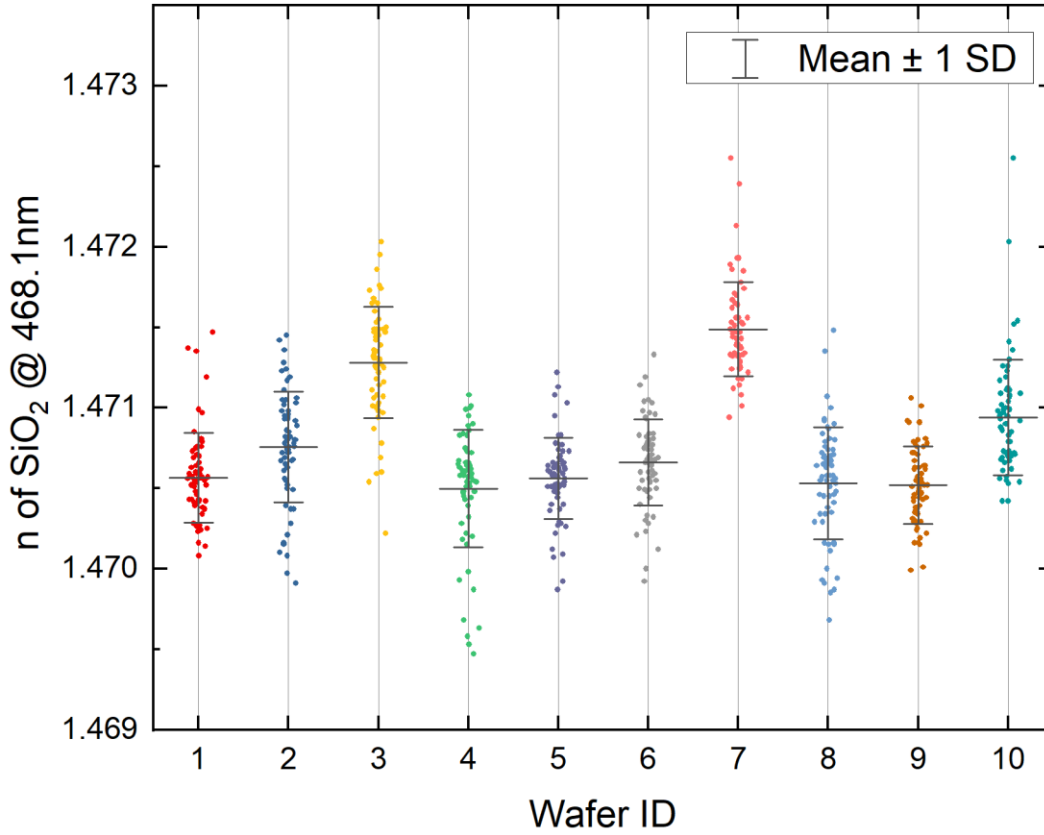
Map uniformity of thermal oxide thickness, and refractive index at 468.1nm and 656.3nm.

Samples

10x 100mm SSP Si wafers with thermal oxide.

Results Summary





Sample: 01

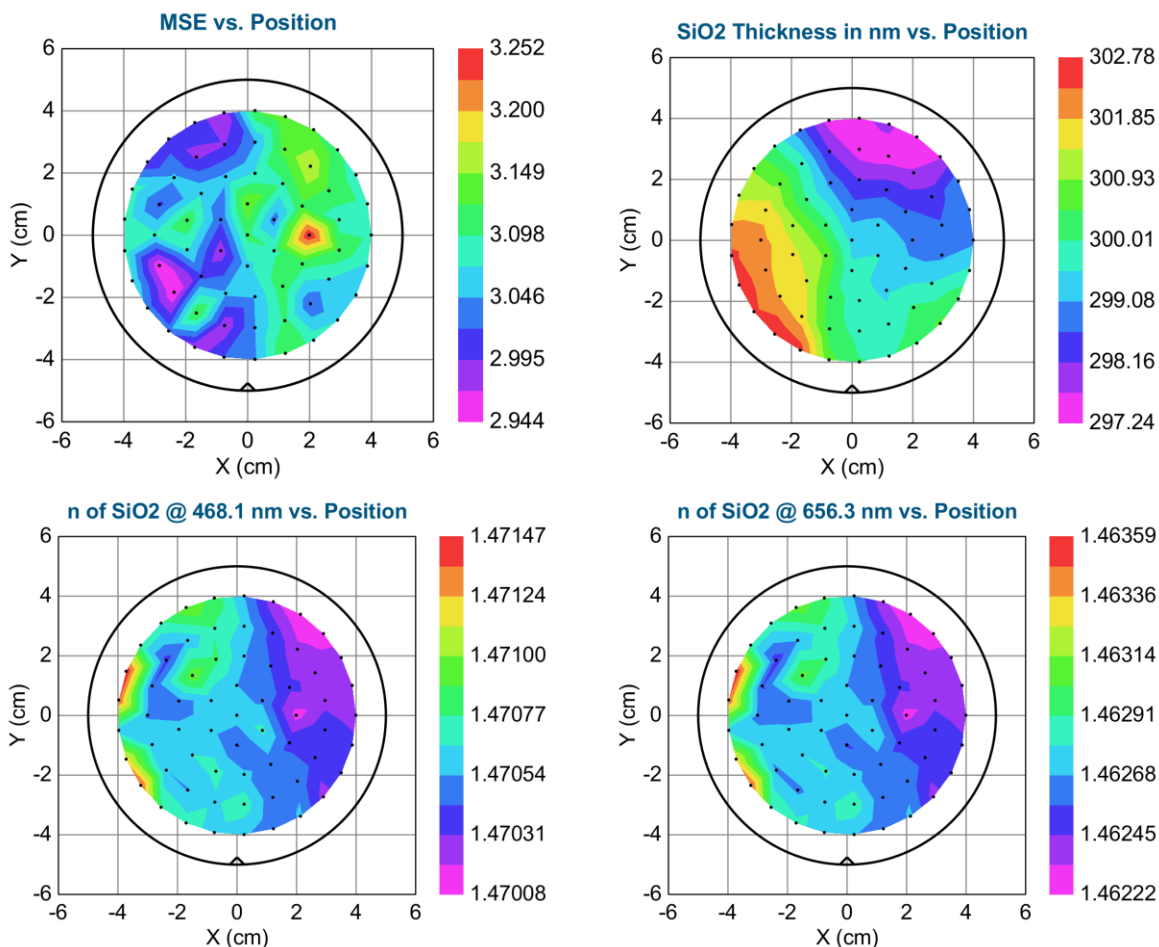
Optical Model

+ Layer # 2 = SiO2 SiO2 Thickness = 299.64 nm (fit)
Layer # 1 = Interface Interface Thickness = 1.17 nm (fit)
Substrate = Si

Fit Results

Parameter	Average	Min.	Max.	Std. Dev.	% Range
MSE	3.067	2.944	3.252	0.057	10.031
SiO2 Thickness (nm)	299.87	297.24	302.78	1.48	1.8473
n of SiO2 @ 468.1 nm	1.4706	1.4701	1.4715	0.0003	0.0939
n of SiO2 @ 656.3 nm	1.4627	1.4622	1.4636	0.0003	0.0936

Model Parameters vs. Position



Sample: 02

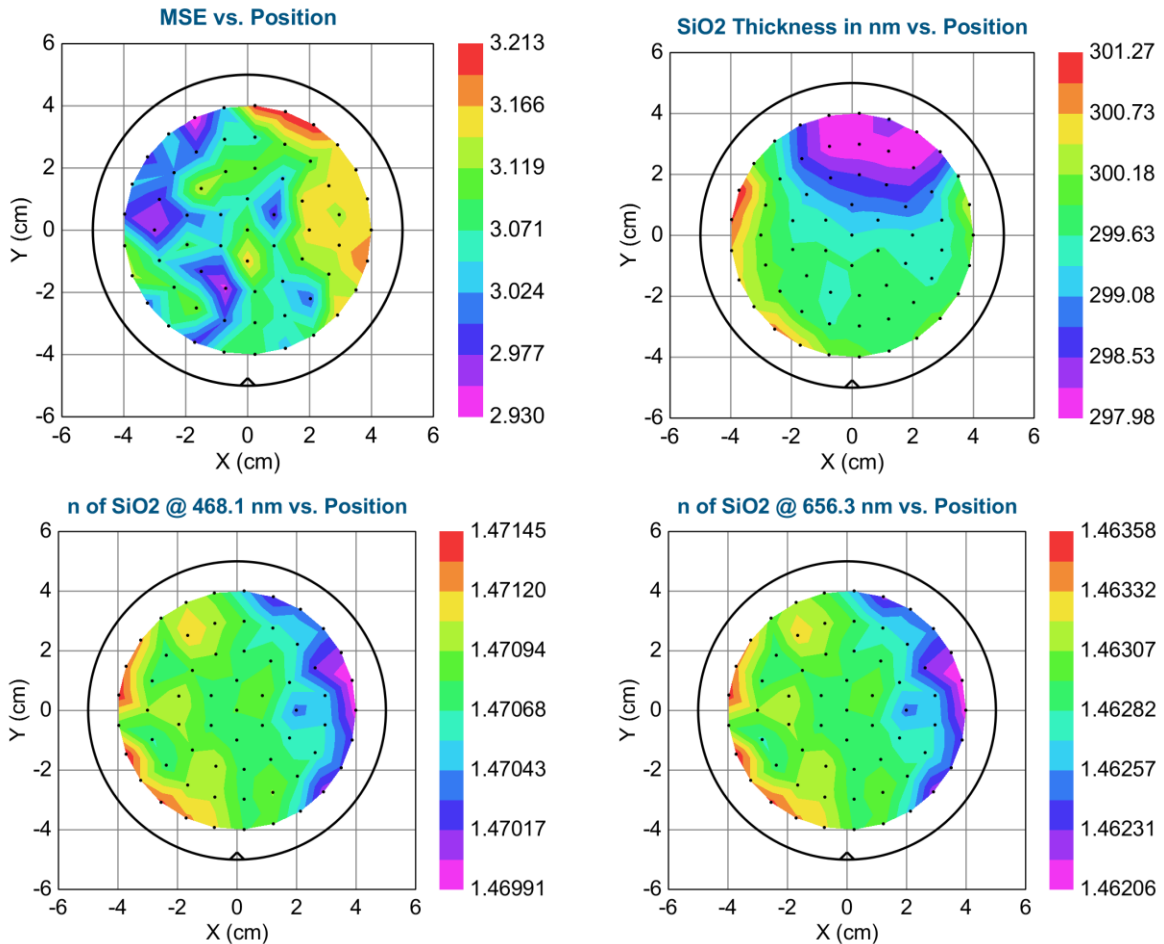
Optical Model

+ Layer # 2 = <u>SiO2</u> SiO2 Thickness = <u>299.90 nm</u> (fit)
Layer # 1 = <u>Interface</u> Interface Thickness = <u>1.19 nm</u> (fit)
Substrate = <u>Si</u>

Fit Results

Parameter	Average	Min.	Max.	Std. Dev.	% Range
MSE	3.079	2.930	3.213	0.069	9.198
SiO2 Thickness (nm)	299.50	297.98	301.27	0.79	1.0991
n of SiO2 @ 468.1 nm	1.4708	1.4699	1.4715	0.0003	0.1048
n of SiO2 @ 656.3 nm	1.4629	1.4621	1.4636	0.0003	0.1035

Model Parameters vs. Position



Sample: 03

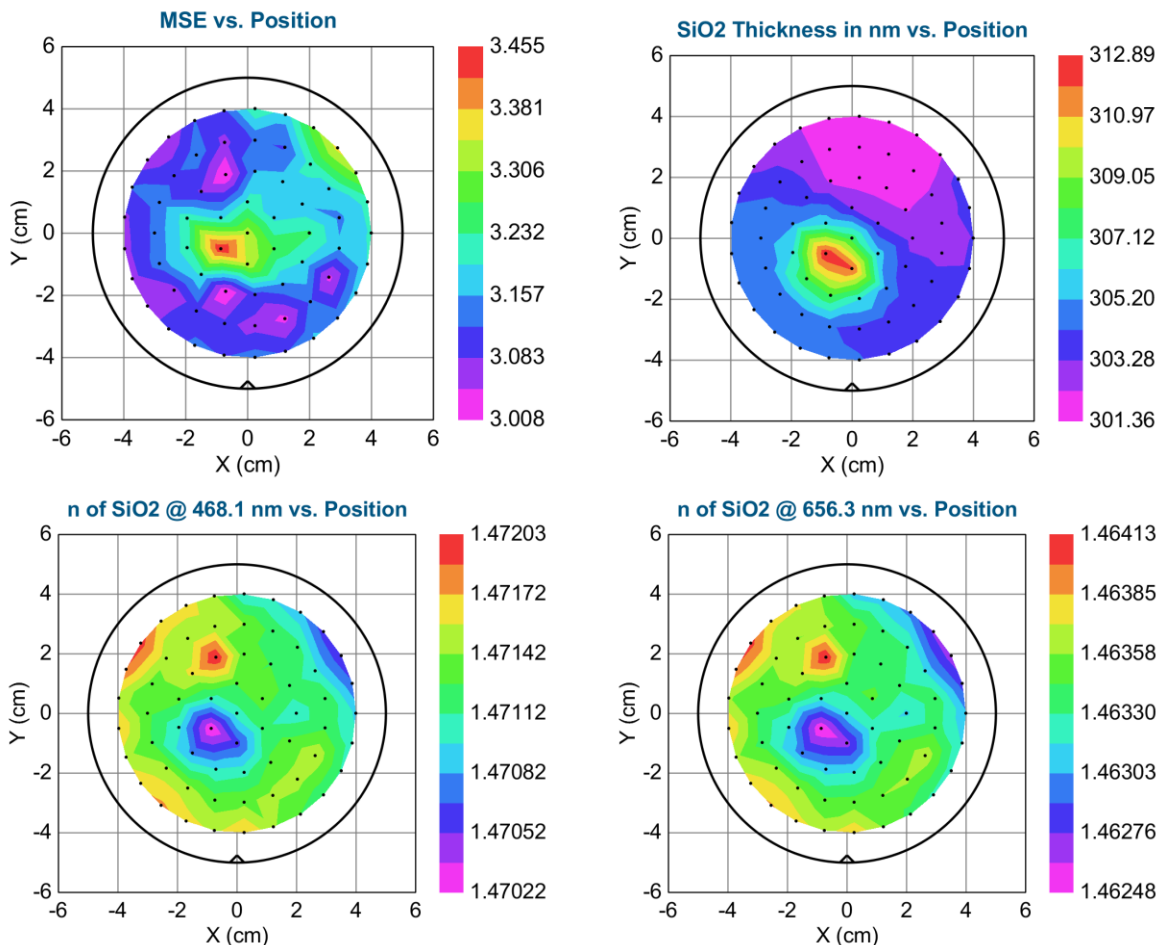
Optical Model

+ Layer # 2 = SiO2 SiO2 Thickness = 303.34 nm (fit)
Layer # 1 = Interface Interface Thickness = 1.18 nm (fit)
Substrate = Si

Fit Results

Parameter	Average	Min.	Max.	Std. Dev.	% Range
MSE	3.154	3.008	3.455	0.086	14.184
SiO2 Thickness (nm)	304.00	301.36	312.89	2.16	3.7932
n of SiO2 @ 468.1 nm	1.4713	1.4702	1.4720	0.0003	0.1229
n of SiO2 @ 656.3 nm	1.4634	1.4625	1.4641	0.0003	0.1127

Model Parameters vs. Position



Sample: 04

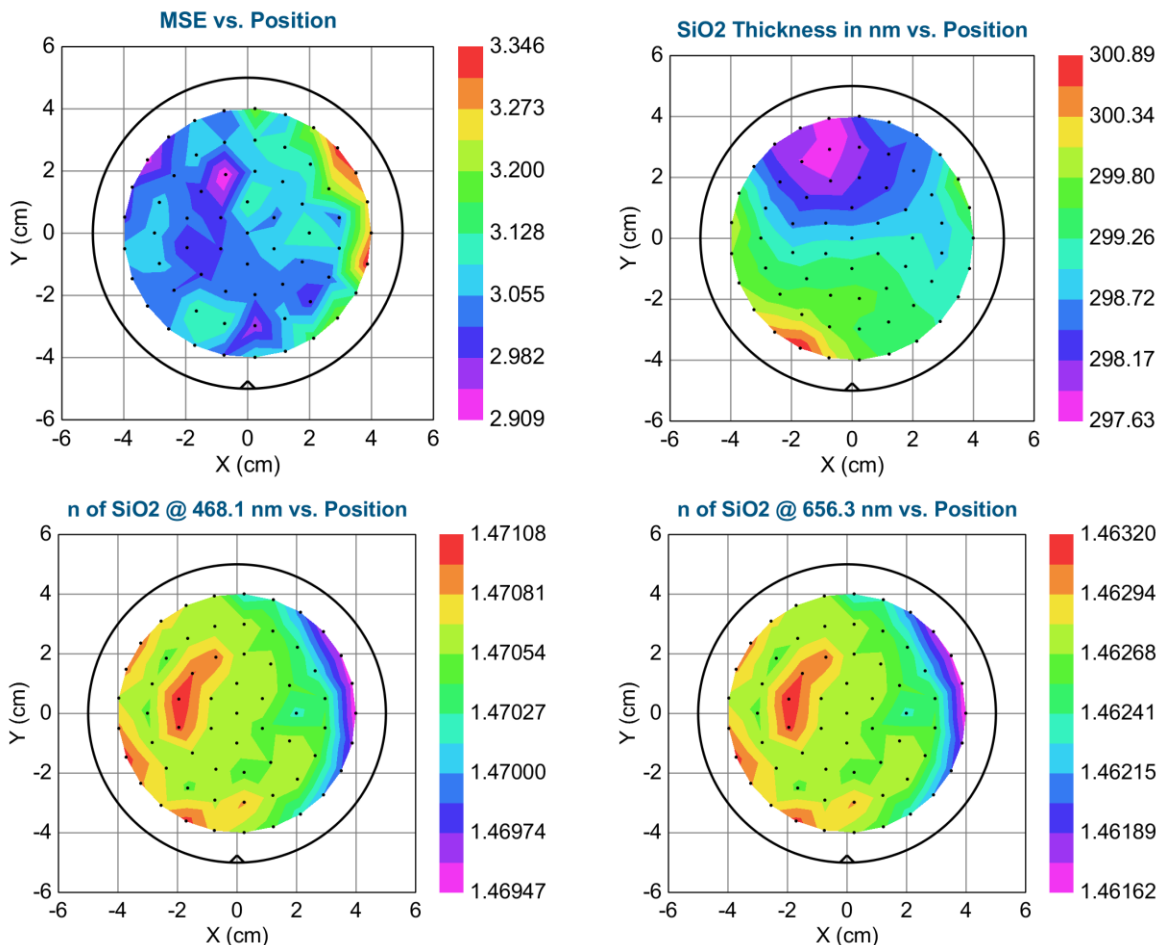
Optical Model

+ Layer # 2 = SiO2 SiO2 Thickness = 299.20 nm (fit)
Layer # 1 = Interface Interface Thickness = 1.23 nm (fit)
Substrate = Si

Fit Results

Parameter	Average	Min.	Max.	Std. Dev.	% Range
MSE	3.080	2.909	3.346	0.089	14.177
SiO2 Thickness (nm)	299.06	297.63	300.89	0.68	1.0894
n of SiO2 @ 468.1 nm	1.4705	1.4695	1.4711	0.0004	0.1094
n of SiO2 @ 656.3 nm	1.4626	1.4616	1.4632	0.0004	0.1080

Model Parameters vs. Position



Sample: 05

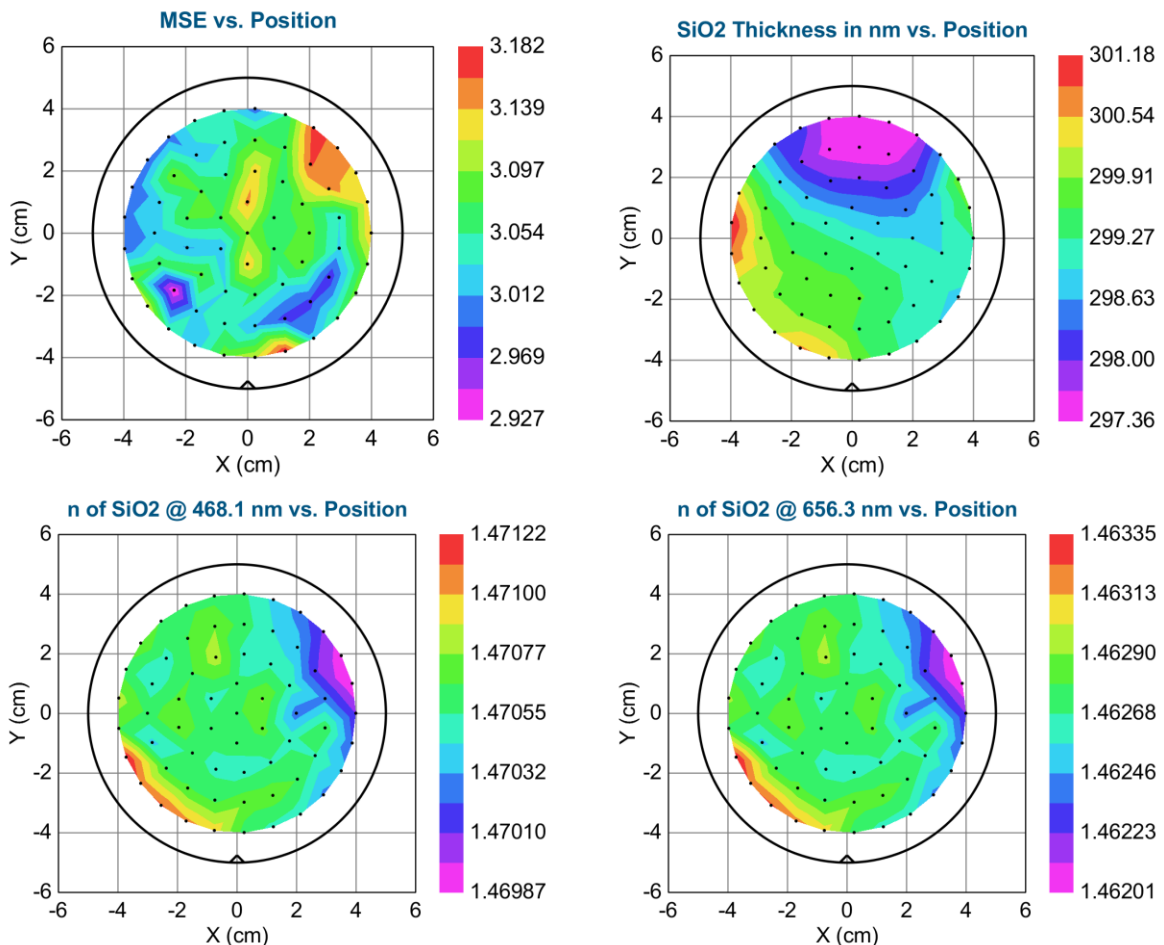
Optical Model

+ Layer # 2 = SiO2 SiO2 Thickness = 299.05 nm (fit)
Layer # 1 = Interface Interface Thickness = 1.20 nm (fit)
Substrate = Si

Fit Results

Parameter	Average	Min.	Max.	Std. Dev.	% Range
MSE	3.063	2.927	3.182	0.054	8.329
SiO2 Thickness (nm)	299.11	297.36	301.18	0.89	1.2751
n of SiO2 @ 468.1 nm	1.4706	1.4699	1.4712	0.0003	0.0915
n of SiO2 @ 656.3 nm	1.4627	1.4620	1.4634	0.0003	0.0919

Model Parameters vs. Position



Sample: 06

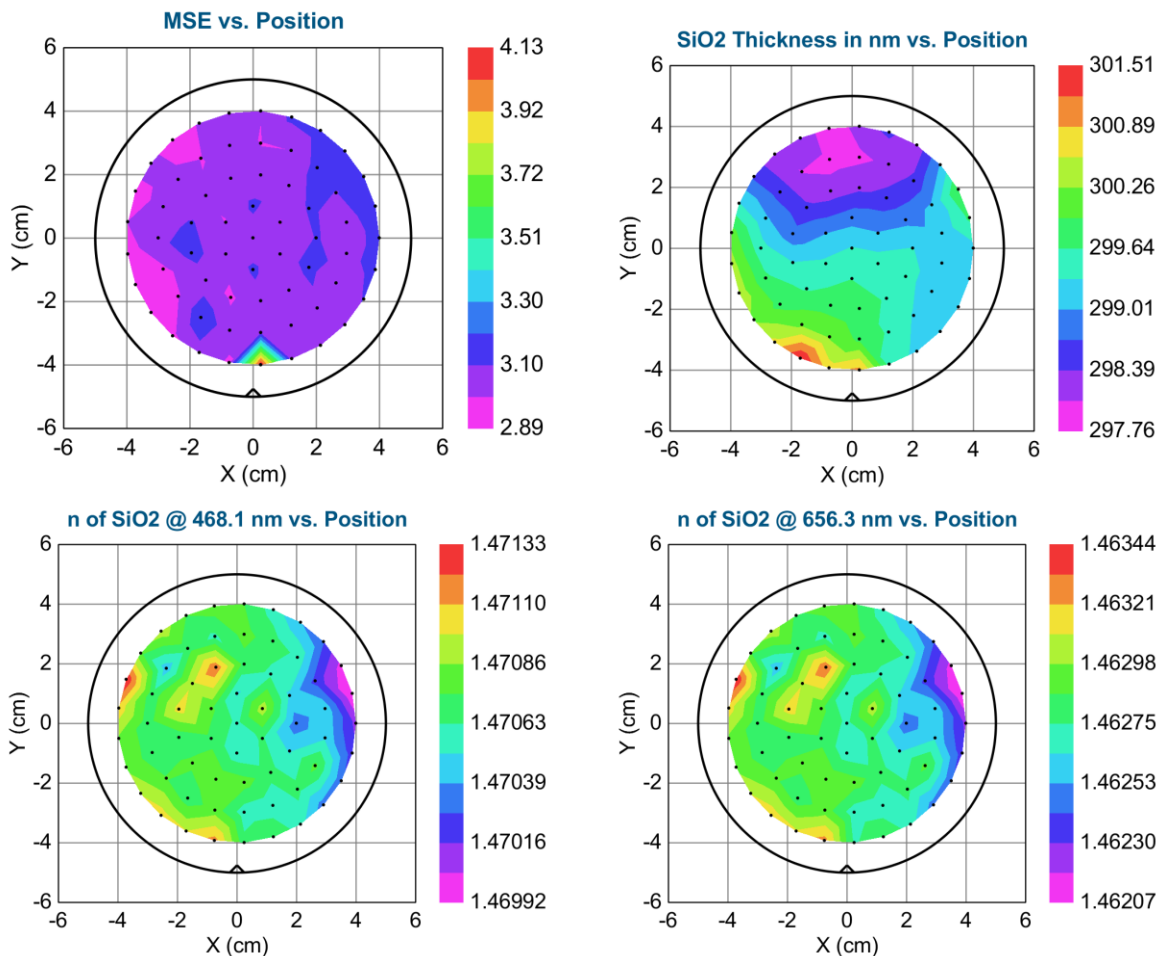
Optical Model

+ Layer # 2 = SiO2 SiO2 Thickness = 299.06 nm (fit)
Layer # 1 = Interface Interface Thickness = 1.22 nm (fit)
Substrate = Si

Fit Results

Parameter	Average	Min.	Max.	Std. Dev.	% Range
MSE	3.063	2.889	4.128	0.149	40.440
SiO2 Thickness (nm)	299.25	297.76	301.51	0.79	1.2526
n of SiO2 @ 468.1 nm	1.4707	1.4699	1.4713	0.0003	0.0956
n of SiO2 @ 656.3 nm	1.4628	1.4621	1.4634	0.0003	0.0935

Model Parameters vs. Position



Sample: 07

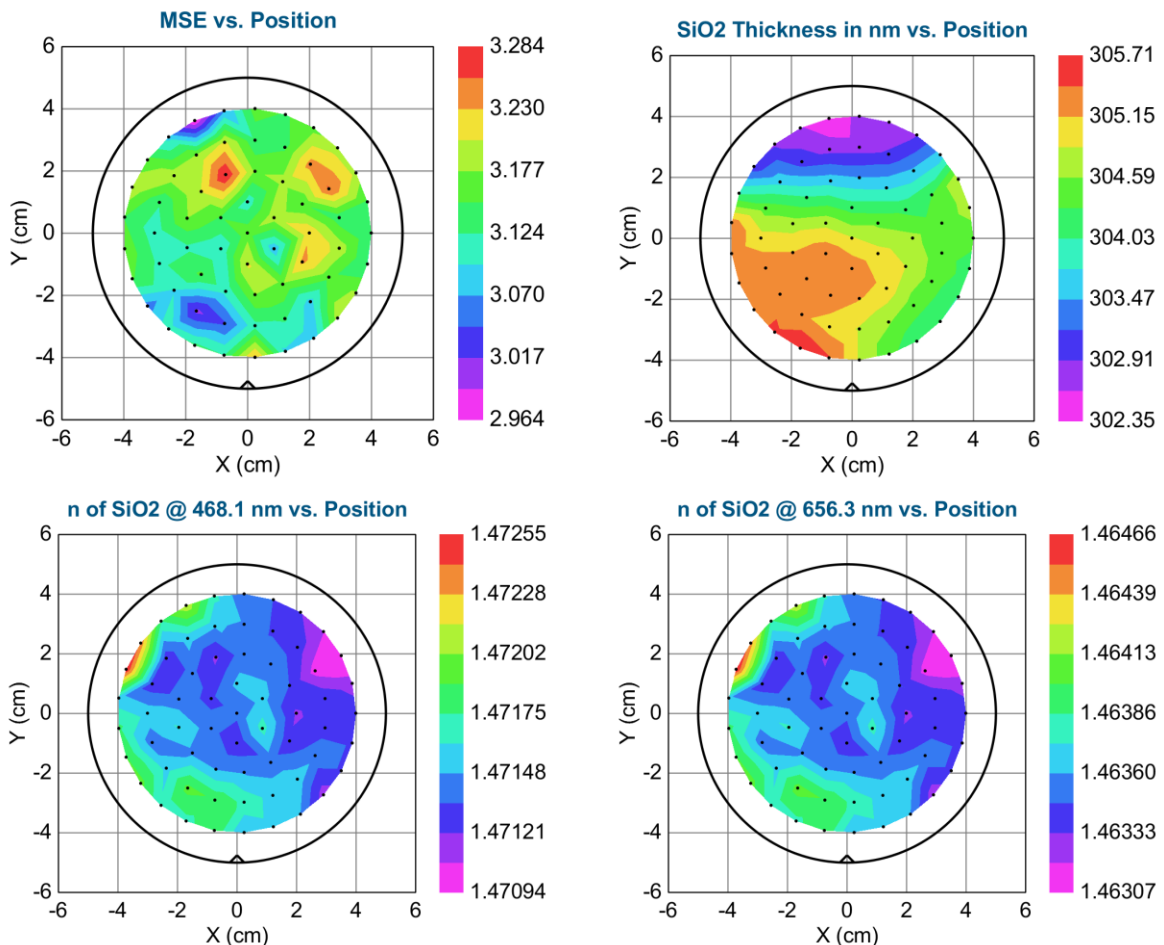
Optical Model

+ Layer # 2 = SiO2 SiO2 Thickness = 304.21 nm (fit)
Layer # 1 = Interface Interface Thickness = 1.15 nm (fit)
Substrate = Si

Fit Results

Parameter	Average	Min.	Max.	Std. Dev.	% Range
MSE	3.148	2.964	3.284	0.058	10.163
SiO2 Thickness (nm)	304.35	302.35	305.71	0.90	1.1045
n of SiO2 @ 468.1 nm	1.4715	1.4709	1.4726	0.0003	0.1097
n of SiO2 @ 656.3 nm	1.4636	1.4631	1.4647	0.0003	0.1083

Model Parameters vs. Position



Sample: 08

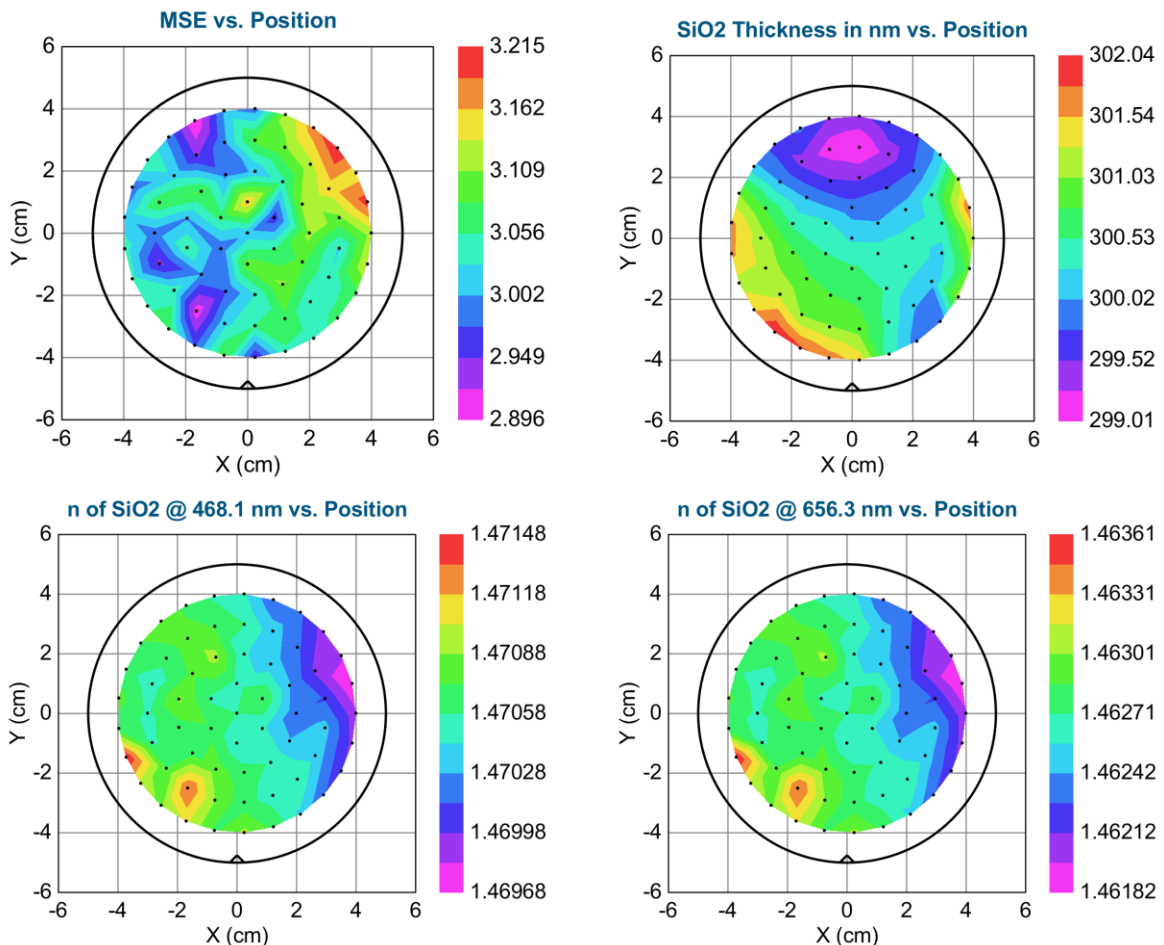
Optical Model

+ Layer # 2 = SiO2 SiO2 Thickness = 300.89 nm (fit)
Layer # 1 = Interface Interface Thickness = 1.18 nm (fit)
Substrate = Si

Fit Results

Parameter	Average	Min.	Max.	Std. Dev.	% Range
MSE	3.050	2.896	3.215	0.068	10.456
SiO2 Thickness (nm)	300.46	299.01	302.04	0.73	1.0082
n of SiO2 @ 468.1 nm	1.4705	1.4697	1.4715	0.0003	0.1228
n of SiO2 @ 656.3 nm	1.4627	1.4618	1.4636	0.0003	0.1220

Model Parameters vs. Position



Sample: 09

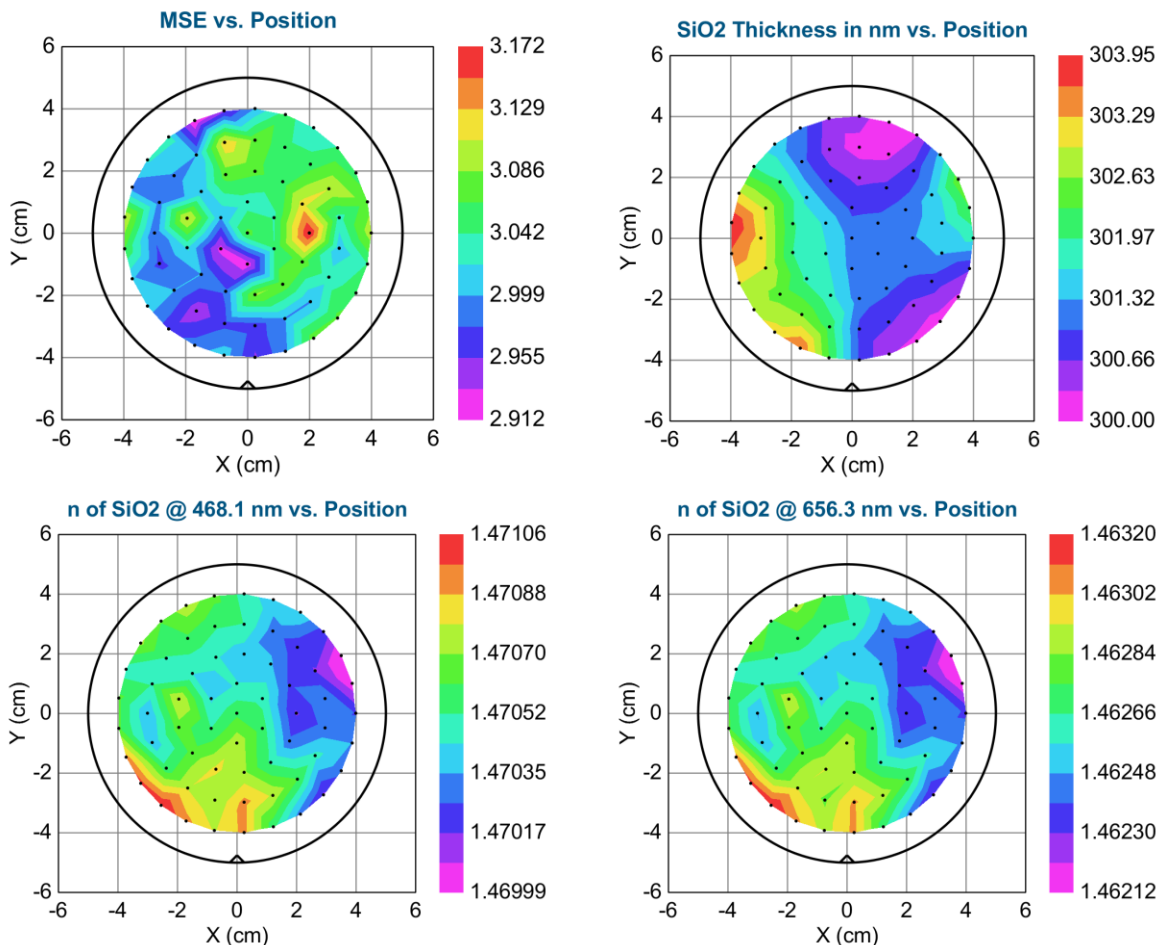
Optical Model

+ Layer # 2 = SiO2 SiO2 Thickness = 300.70 nm (fit)
Layer # 1 = Interface Interface Thickness = 1.16 nm (fit)
Substrate = Si

Fit Results

Parameter	Average	Min.	Max.	Std. Dev.	% Range
MSE	3.027	2.912	3.172	0.054	8.603
SiO2 Thickness (nm)	301.51	300.00	303.95	0.98	1.3100
n of SiO2 @ 468.1 nm	1.4705	1.4700	1.4711	0.0002	0.0728
n of SiO2 @ 656.3 nm	1.4626	1.4621	1.4632	0.0002	0.0735

Model Parameters vs. Position



Sample: 10

Optical Model

+ Layer # 2 = SiO2 SiO2 Thickness = 301.58 nm (fit)
Layer # 1 = Interface Interface Thickness = 1.19 nm (fit)
Substrate = Si

Fit Results

Parameter	Average	Min.	Max.	Std. Dev.	% Range
MSE	2.992	2.854	3.369	0.082	17.234
SiO2 Thickness (nm)	301.88	300.63	303.66	0.71	1.0055
n of SiO2 @ 468.1 nm	1.4709	1.4704	1.4725	0.0004	0.1447
n of SiO2 @ 656.3 nm	1.4631	1.4625	1.4646	0.0004	0.1430

Model Parameters vs. Position

