

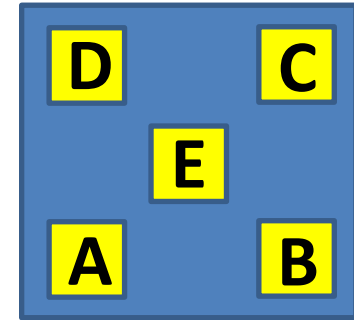
Transmittance of optical elements irradiated/not-irradiated at LNF

Luciano Pappalardo

Local variations of transmittance

New, more precise, measurements:

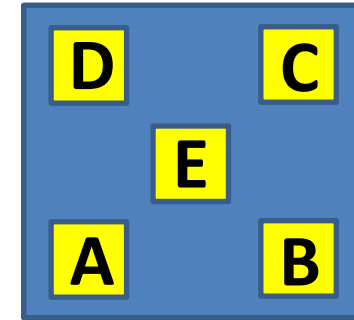
- Each sample measured in 5 different points (A,B,C,D,E)
- Each point measured 5 times and results averaged
- Total of 25 measurements per each sample
- Data collected in 350 – 400 *nm* range (not analyzed)
- **Results below refer to $\lambda = 400 \text{ nm}$**



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H8500 glass windows

L14U2 (irradiated)		L14U (not irradiated)		L141 (irradiated)		L14 (not irradiated)	
T(A)	92.19 ± 0.03	T(A)	92.31 ± 0.01	T(A)	88.59 ± 0.01	T(A)	91.98 ± 0.01
T(B)	92.06 ± 0.01	T(B)	92.44 ± 0.00	T(B)	89.82 ± 0.01	T(B)	92.17 ± 0.01
T(C)	92.29 ± 0.01	T(C)	92.48 ± 0.01	T(C)	89.70 ± 0.00	T(C)	92.18 ± 0.01
T(D)	91.98 ± 0.03	T(D)	92.36 ± 0.01	T(D)	88.91 ± 0.01	T(D)	92.04 ± 0.03
T(E)	92.14 ± 0.01	T(E)	92.36 ± 0.01	T(E)	89.53 ± 0.01	T(E)	92.07 ± 0.01
spread	0.3%	spread	0.2%	spread	1.4%	spread	0.2%
Mean	92.13 ± 0.12	Mean	92.39 ± 0.07	Mean	89.31 ± 0.53	Mean	92.09 ± 0.09

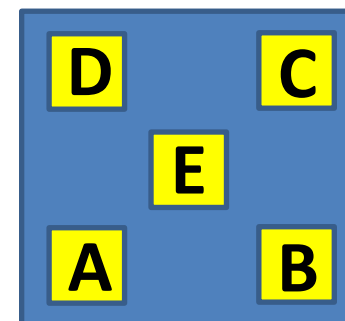
compatible

~5 σ effect !

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Lucite foils

Short tape (irradiated)		Long tape (not irradiated)	
T(A)	89.04 ± 0.01	T(A)	90.82 ± 0.01
T(B)	89.87 ± 0.01	T(B)	90.37 ± 0.01
T(C)	89.88 ± 0.01	T(C)	90.52 ± 0.01
T(D)	88.82 ± 0.01	T(D)	90.84 ± 0.01
T(E)	89.25 ± 0.01	T(E)	90.69 ± 0.01
spread	1.2%	spread	0.5%
Mean	89.37 ± 0.48	Mean	90.65 ± 0.20

~2.5 σ effect

Global results and conclusions

Name	Irrad.	spread	Average	Old meas
L14U2	Yes	0.3%	92.13 ± 0.12	91.83 ± 0.05
L14U	No	0.2%	92.39 ± 0.07	92.53 ± 0.12
L141	Yes	1.4%	89.31 ± 0.53	89.37 ± 0.12
L14	No	0.2%	92.09 ± 0.09	91.87 ± 0.05
Lucite S.	Yes	1.2%	89.37 ± 0.48	85.87 ± 0.90
Lucite L.	No	0.5%	90.65 ± 0.20	89.73 ± 0.12

Conclusions:

- Effects of irradiation on optical quality are in general small (but significant in 2 cases)
- Local variations are small (largest spread ($\sim 1\%$) observed for L141 and Lucite S, both irradiated)
- Glass windows L14U2 and L14U have similar average transmittance (no effect)
- Glass windows L141 and L14 have different average transmittance (effect of radiation?)
- Lucite samples have more or less the same average transmittance (tiny effect)
- New measurement for Lucite S. (irradiated) differs substantially from previous one (Oct. 11):
 - transmission recovered after ~ 1 month?
 - previous measurement was wrong.

Backup

Name	Irrad.	T(A) [%]	T(B) [%]	T(C) [%]	T(D) [%]	T(E) [%]	Average	Old meas
L14U2	Yes	92.19 ± 0.03	92.06 ± 0.01	92.29 ± 0.01	92.19 ± 0.03	91.98 ± 0.03	92.13 ± 0.12	91.83 ± 0.05
L14U	No	92.31 ± 0.01	92.44 ± 0.00	92.48 ± 0.01	92.36 ± 0.01	92.36 ± 0.01	92.39 ± 0.07	92.53 ± 0.12
L141	Yes	88.59 ± 0.01	89.82 ± 0.01	89.70 ± 0.00	88.91 ± 0.01	89.53 ± 0.01	89.31 ± 0.53	89.37 ± 0.12
L14	No	91.98 ± 0.01	92.17 ± 0.01	92.18 ± 0.01	92.04 ± 0.03	92.07 ± 0.01	92.09 ± 0.09	91.87 ± 0.05
Lucite S.	Yes	89.04 ± 0.01	89.87 ± 0.01	89.88 ± 0.01	88.82 ± 0.01	89.25 ± 0.01	89.37 ± 0.48	85.87 ± 0.90
Lucite L.	No	90.82 ± 0.01	90.37 ± 0.01	90.52 ± 0.01	90.84 ± 0.01	90.69 ± 0.01	90.65 ± 0.20	89.73 ± 0.12

Previous measurements: Oct. 11 2013

Sample	T measurements (@ 400 nm)	Average
L14U2	91.8 – 91.9 – 91.8	91.83 ± 0.05
L14U	92.4 – 92.5 – 92.7	92.53 ± 0.12
L14	91.9 – 91.9 – 91.8	91.87 ± 0.05
L141	89.5 – 89.2 – 89.4	89.37 ± 0.12
Lucite short tape	85.0 – 85.5 – 87.1	85.87 ± 0.90
Lucite long tape	89.6 – 89.9 – 89.7	89.73 ± 0.12