

Optical characterization and irradiation tests at ENEA Calliope lab

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Dry box for optical (transmittance) measurements

A second black box hosting one crystal at a time is being constructed in Casaccia (A. Lucchi)

- dry air (or nitrogen, argon) flushing around the crystal
- Two large quartz windows and six couples of quartz windows on the sides allow for longitudinal and transverse transmittance measurements using the Lumen spectrophotometer
- ready for every Belle II crystal dimension









Two component epoxy resins:

EPOXY Technology – Data Sheet

<u>EPO-TEK 301-2FL</u>	Minimum Bond Line Cure Schedule:		Spectral transmission @ 23°C:
	80°C 23°C	3 hours 3 days	>97% @1000-1600nm >99% @400-1000nm
<u>EPO-TEK 305</u>	65°C 23°C	1 hour 24 hours	>91% @ 250nm >97% @ 300nm >98% @400-1600nm

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1) teflon support (non-stick surface):

"smooth" teflon surface





"rough" teflon surface



...disadvantage: defects due to the teflon surface (grooves, scratchs)

samples prepared immediately after resin mixing and after 2 hours:





2) single-quartz support:





Optical characterization and irradiation parameters

... before and after irradiation... Transmittance curves Range: 200-800 nm UV-VIS spectrometer Lambda 950 (Perkin-Elmer)



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Optical characterization: epo-tek 305 resin under irradiation



Optical characterization: epo-tek 301 and 305, BC630, Dow corning 3145



	Thickness [μ]	%Transmittance @ 320 nm [a.u.]
Epo-tek 301	120	84.06
	470	69.64
Epo-tek 305	210	71.79
	730	38.89

	Thickness [µ]	%Transmittance @ 320 nm [a.u.]
BC630	100	86
	200	87
Dow Corning 3145	100	94
	210	75

Optical characterization and irradiation tests: conclusion



Conclusion:

- despite the %T "jump" around 320nm, epo-tek 301 seems to present best results than epo-tek 305:
 - higher gamma irradiation resistance
 - higher %T @320 nm
 - %T less dependent on the thickness
- epo-tek 301 behaviour similar to that of BC630 grease

...next steps...

- optimization of sample preparation (controlled thickness, 1mm)
- irradiation tests on BC630 grease, grease+resin and epo-tek 305 up to 13.2Gy absorbed doses.