

Minutes of the Core Optics Subgroup, 12/13/01

9 am PST US/Europe meeting

Florida: Dave R.

MIT: Peter F., Gregg H.

CIT: Gari B., Helena A., Gary S.

Stanford: Sheila R., Norna R., Roger R., Vlad K.,

**NOTICE: We are establishing a list of substrates that are undergoing testing for Advanced LIGO. please send a description of any test substrates you have to Helena or Gari, these will be posted on a page similar to <http://www.ligo.caltech.edu/~gari/COCAsBuilt.htm> and we have an ilog set up to input data at: <http://tintagel.mit.edu/ilog/>**

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### 1) Coating Status

Gregg Harry reports that samples cleaned and annealed at Lyon (with no other processing) had an increased Q, by about a factor of 2. Another group of substrates at Lyon is due back at the end of this week. This group includes one 3"x1" sample which has only been cleaned and annealed. Pre-coating Qs measure 5-20 million; we may get a lot of variation post-coating as well. Another batch of 2 thin and 2 thick samples will be sent to Lyon next week.

Gary Sanders relayed info from a phone call with Jean-Marie (JMM), that the ETMs for Virgo have been coated and absorption measures 0.6 ppm, scatter measures 8 ppm from point defects. JMM is more confident that the AdLIGO coating goals can be met.

Gari advocated obtaining some of the 0.2 ppm coating absorption samples which have been reported on from Lyon, first, to get an independent measurement, but more importantly to make another try at studying contamination. The previous contamination testing seemed to indicate that absorption does not change with exposure to contaminants at the 0.5 ppm level. Since the 0.2 ppm level is much closer to AdLIGO goals, we may want to study contamination on these coatings to see if we get changes due to contamination.

Helena reports that samples from 4 coating vendors (GO, REO, MLD and Lyon) have been sent for scanning electron microscopy analysis: we should have results next week.

Dave Reitze asks: at what point in the coating development work should we introduce sapphire substrates? The consensus was that we should aim for the time when we have information on the coating/substrate interface.

Gregg reports that we will have the opportunity to measure the Q of the TNI substrates before and after coating.

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## 2) Polishing Status (Gari)

GariLynn reports that Goodrich is ~2 weeks away from finishing up the compensating polish of the large piece. They have gone through extensive calibration of removal rate working on both a and m axis sapphire. They understand the removal rate well now. They have been through 1 cycle of compensation and reached an rms of 49 nm, they predict that they will reach their goal of 15 nm after the next run. They also report that swirl marks are left by the tool on a-axis material but not on m-axis material. They are confident that they can put the part on pitch and smooth these swirls, but note that it is an extra step.

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## 3) Sapphire Absorption (Roger)

Roger reports that they are shaking down the new system and the new operator. Alex is occasionally available, but Vlad is now up to speed on the operation of the system. They have still not received the new furnace, but all is in readiness and they will be able to start absorption studies once it arrives. They are reluctant to start the coating absorption measurements on the MLD substrates until they have measured some of the sapphire. Standards are an issue with Fused silica measurements. They have ordered some metallic fused silica neutral density filters.

Roger has had a conversation with Fred Schmidt of Crystal Systems regarding the partitioning of information, Fred is to get back to Roger with something in writing.

Boule 8 had a veil in it, one area with absorption of 100 the other with 10 ppm/cm absorption. We want to get hold of the boule and have it polished at Miller Optics and carve out the boundary to enable micro-chemical analysis. Mark Felt still needs to get a quote to Roger for the polish.

Vladimir reports on the cleaning of samples before absorption measurement. Peaks are usually seen near the surface when doing a front to back scan. After cleaning with de-greaser then methanol, acetone and water the surface peaks were down, he cautions that on receiving samples they should be well cleaned before measuring.

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## 4) Q measurements (Gregg, Sheila)

A coated sapphire sample that was measured previously is being compared to a model for coating loss. Alex has been working on tweaking the model to better reflect the measurement. The model and measurements are converging. Currently, to get a consistent answer for the coating loss they have to discard one of their data points, the highest Q mode. They are not happy about this and are working on the analysis to try and explain the results.

Things are getting going at MIT in Q measurements. Gregg has distributed an updated version of the coating development plan, those with input are welcome to comment.

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## 5) Wrap up, upcoming deadlines (Gary)

See above notice.

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5:30 pm PST Telecon

CIT: Gari, Bill K.

UWA: David B., Ju L.

UF: Dave

A recap of the morning meeting was relayed to the UWA group. Also, a discussion of the Gingin Facility Meeting – David Blair will send minutes to Dave Reitze.