Minutes of the Core Optics Subgroup, 10/11/01

9 am PST US/Europe meeting

CIT: Gari B., Gary S., Helena A., Dennis C., Bill K.
MIT: Gregg H., Peter F., David S.
Glasgow: Jim H., Sheila R.
Stanford: Roger R., Norna R.
UF: Dave R., Guido M.
Iowa State: Norio N.

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1) Coating Status (Helena)

- Two 3" x 0.1" substrates were sent to Lyon where they will be cleaned and annealed. The Q was measured before shipment and will be measured after the cleaning and annealing process. The "before" Qs were measured as 12 M and 14M in the butterfly mode. There are 4 more thin substrates to be measured (2 with Steve Penn @ Syracuse and 2 with Gregg at MIT). There are also 4 more at Glasgow with Jim and Sheila.

- Jean-Marie Mackowski (JMM) has started looking at coating absorption. Helena and Gregg will go to Lyon at the end of the month to discuss the coating development project. Helena reminds us that we need to keep measuring Qs on time to keep schedule.

- Caltech has started working with MLD looking at ways to diminish coating absorption. Coating absorption measurements will start at Stanford, but the concensus of the working group is to have a second measurement elsewhere (perhaps at Lyon). MLD intends to look at 4 different material combinations and at 3 different process temperatures. (Gari asked if these were proprietary. According to Helena, MLD claims that this particular research plan is not, but that there were some things that were). David and Gary noted that it is appropriate for companies to wish to keep their process proprietary, however, they need to inform us if there is a change in the process so that we know when we're dealing with a different variable.

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1) Polishing Status (Gari)
- Goodrich has called and asked for the 6" sapphire piece to be returned to them. They have had trouble getting their process to repeat on the large sapphire piece, and want to check the removal rate again on the smaller piece.

- CSIRO has received the sapphire substrates for the compensation polishing trials. They anticipate having results in mid January.

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3) Sapphire Absorption (Roger)

- Facility renovation is done and everything is re-aligned and recalibrated. Stanford now have Vladimir Kondelenko (sp?) to help in the lab for 16 hrs/ wk. The hand off from Alex to Vlad should occur today or this weekend. They also have several cubes comprised of various starting materials to be measured. For comparison of annealing methods, a slew of windows which will be cut in half an annealed at CSI and Stanford. Stanford should have a small high temperature furnace within the next 2 weeks that can duplicate the CSI furnace temperatures.

- Update from Helena on coating absorption measurements: The substrates will be 1" by .250 thick. We should have coated substrates in about a week for measurements. We will have 6 samples, 2 of each type, annealed at 3 different temperatures. For those measurements, a 0.5-1ppm resolution is available using the 10 W Lightwave laser in the absorption measurement facility at Stanford.

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4) Q measurements (Gregg, Sheila)

- Gregg: two samples have been Q characterized and sent to Lyon. Unfortunately, one of the samples had heat damage from the welding process. The heat marks extend to half the diameter of one part. It is not clear that the other sample's bond was good; it was more lightly welded (which may yield a bad Q measurement, but doesn't appear to damage the surface polish). Qs of both pieces measured the same in this instance. Helena will send around pictures of the damaged surface. The damage was only seen on one piece while looking visually. With crossed polarizers you do see a lot of stress in the part. Gregg suggested we might get by only measuring the "post-coating" Q's once we have established a set of baseline "pre-coating" Q values for this size and shape substrate (assuming they're all uniform…).
- The MIT vacuum system should be back up in a week or so. The conclusion is that it had gotten dirty.

- Sheila: Four each 3" by 1" samples have arrived recently. These will be suspended on silk thread for initial testing. The aim is to get all 4 characterized by the end of October (or at least 2). We will want to check the Q after clean and anneal first because the annealing process could affect the 2 different geometries used in Q evaluation differently. Annealing may effect Qs greatly, based on results obtained in Japan.

- Helena will send the Q/coating plans to Dave Reitze, who will distribute them.

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5) Wrap up, upcoming deadlines (Gary)

- Crystal Systems and China are both doing crystal growth. CSI is now aware of a Hong Kong partner with SIOM. CSI sees our work with SIOM as perhaps enabling SIOM to enter other competitive markets with CSI, which distresses them somewhat. Nevertheless, LIGO's intention is to proceed in parallel with both partners. However, we will have to be more careful and more formal with information exchange to assuage the fears of CSI that proprietary information does not get inadvertently transferred.

6:30 pm PST Telecon

CIT: Gari
UWA: David B., Ju L., Young Lan
UF: Dave

- DB reports that the annealing paper is almost done, and should be available for circulation the week of Oct. 15th. DB will also forward a web link to Darren Padgett's which contains finite element analysis of various test mass modes as well as thermal noise estimates.

- DB suggests that Young Lan might start looking at thermal lensing by using a 1/2 watt laser in a locked cavity and imaging the laser spot at 80 meters. This would enable verification of the thermal time constant. They might also try the heater method of thermal compensation and see what the effect is on the imaged spot.

- DR encourages gaining experience in aligning and locking long optical cavities for upcoming Gingin work.