

## Minutes of TC8-10 Meeting 7 July 2006

### Action Items:

Danny Rich:

- Purchase PTFE standard and ship to Janos. Let Janos know the dimensions of the standard ASAP.
- Contact OSRAM/Sylvania and Joanne Zwinkels.

Janos Schanda:

- build white LED calibration unit
- Look for contacts at LBL to get information on window glass transmission
- Ask Dave Sliney of Division 6 about UV irradiance indoors.

Todd:

- Ask Wout von Bommel for information from Philips about the UV characteristics of their lamps.
- Update TC8-10 web site
- Ask other TCCs to update their web sites
- Share the CIE document that categorizes types of work.

Al Kravetz:

- Send information on devices that can measure below 350 nm.

### Agenda

1. Agenda Review
2. Introduction of new members
3. Liaison reports
4. Review from tasks
  - a. Instrumentation (Al Kravetz)
  - b. Questionnaire (Todd Newman)
  - c. Measurement analysis (Danny Rich)
5. Pilot Study
  - what progress have we made
  - what needs to be done and who will do it?
6. Next meeting

### Attendees

Danny Rich, Al Kravetz, Janos Schanda, Jordi Arnabat, Yamauchi-san, Dave McDowell, Todd Newman. Ann McCarthy joined half an hour into the meeting.

1. Agenda review:

The agenda was accepted as initially proposed.

2. Introduction of New Members:

Phil Green (London College of Communication) and Mark Fairchild (RIT) have joined the TC, but not attended. [Since the meeting, Ronnier Luo of Leeds University indicated that he will be able to help out with the TC as well.]

3. No liaison reports were offered.

4. Review from Tasks:

4.a. **Instrumentation:** Al Kravetz started the discussion by mentioned the LightSpex product, which is a tool for measuring ambient illumination. GretagMacbeth (now X-Rite) had generously offered a two month loan. Al's rationale for arranging the loaner was that if we wanted to make measurements at a lot of sites, we would want an instrument available that could be shipped from site to site easily. Todd Newman felt that the measurements would take longer than two months.

But several TC members pointed out that they already had telespectoradiometers. Jordi Arnabat has a PR650 in Barcelona and one in San Diego. Janos Schanda has a PR 705 and could do measurements in Hungary. Todd has a PR650. Yamauchi-san has a PR650 and a 701. He also has a friend with a 650. Todd mentioned that Canon, Inc. has a Topcon at its headquarters in Tokyo and could probably loan it and perhaps help with some measurements.

None of the owners of these units wanted to ship them to other sites, but they were comfortable with taking them out of their labs to do on-site measurements reasonably close by.

We discussed the importance of cross-calibrating the devices. There is a significant amount of inter instrument variance. The best way to account for this would be to measure a reference standard with each instrument and then be able to adjust measurement values based on the different measurements of the reference standard. We agreed that the NIST GAS unit was overkill for what we need. We agreed that the white LED unit that Janos was prepared to build would be an excellent solution for our needs.

There was general agreement that measurements should be taken with 5 nm bandwidth and 5 nm steps. This would be appropriate for practical white light sources and for fluorescence lamps.

Danny has agreed to purchase a PTFE standard and send to Janos. Janos will build a frame and do a test with some other lab.

Next there was a discussion about measuring irradiance versus radiance. We agreed that most people expect that "office lighting" means irradiance. But the spectrophotometers measure radiance. If we have measurements from a calibrated standard, however, we can convert back to irradiance. The plan is

to measure a PTFE standard illuminated by the LED source and then by the office lighting environment. Todd suggested that it would be good if we could have calibrated transfer standards as well. That is, those who have their own PTFE disks could also measure those with the LED source. Then they could ship the PTFE standard to the next person, and continue making measurements with their transfer standards. This would allow us to proceed with measurements in parallel.

Dave McDowell wanted a clarification that we to know both the spectral data and the illuminance information. Todd indicated that both were of interest and were specified as such in the Terms of Reference. Janos suggests that if people know the lamps and the illuminance data, we might be able to estimate the spectral power distribution. But Al objected. Dave suggested using a monitor calibrator, but Al was also leery about that. The consensus was that we would stick to using the spectral measurements and illuminance measurements.

### **UV Measurements**

Todd asked how far down into the UV we should measure? Ann says that for paper, fluorescence, color management, and image permanence we need the UV information. Everyone agreed that it would be very nice to have UV information. The question is whether that is practical.

Most of the commercially available instruments do not record down into the UV. In particular, the instruments we had discussed earlier don't go down far enough. Al says that you can't use a LightSpex to measure into the UV. Danny says the PR650 measures from 380-780 nm. But optical brightening agents (OBAs) have their maximum absorption at about 350 nm. And that's just the maximum – they absorb and retransmit from wavelengths even lower than that. Janos says that 340 nm might be far enough, but others suggested measuring even lower.

Calibration also would be much more difficult. The white LEDs have almost no energy down that far.

There are laboratory-grade instruments that could be used to measure the UV. These are manufactured by Optronics, Gamma Scientific and perhaps by Instrument Systems. On the low end, there is also Ocean Optics, but that may be too low-end. These instruments cost about \$60,000. Danny says you won't find diode array systems don't go that far. He has an integrating sphere with a quartz dome or imaging optics for his Optronics 756 that would be suitable. It takes 3-4 minutes to scan through the frequencies.

We decided that we would develop a model for predicting UV values based on illumination levels, and the number and types of lamps and windows. We will gather emission and transmission data from manufacturers and other sources. We will get a few measurements from the high-end instruments. (Danny volunteered and we may be able to get a few more.) Then we will try to create a model and verify it with the data we can get. This model and the data justifying it would be a separate section of the report. The bulk of the report would then be based on the measurements in the visible spectrum made with commercial grade instruments.

Janos suggests we ask lamp companies to report the UV of their lamps. He said that manufacturers gather this information for safety purposes, but they usually don't publish it. Al observed that most lamps in the office have glass envelopes that mostly block UV transmission, but we need to check windows.

Janos said that TC1-66 is gathering data on UV transmission through window glass. So we can leverage

Janos wanted to know if anyone has direct contact to Lawrence Berkeley Lab, they have a database of window glass. No one in the meeting did. But if any other TC members have contact information, please share it with Janos.

Janos asked if we have a contact at GE. Danny doesn't, but he knows people at CORM and all the lighting manufacturers are active in that. He said he would to get that information. Janos said he would find out who to ask. Danny also committed ask the guy who heads the radiometric lab for OSRAM/Sylvania.

Janos agreed to look for contacts and also to ask Dave Sliney for info on UV irradiance indoors. Danny agreed to contact OSRAM/Sylvania and Joanne Zwinkels. Todd volunteered to ask Wout von Bommel for information from Philips.

Danny will send a plaque of PTFE to Janos, but he has to order it first. He'll send the dimensions as soon as possible to Janos. Al will send information on devices that can measure below 360 nm.

#### **Questionnaire:**

Suggested changes:

- Add a line that describes the weather conditions.
- Record the type of work that the office is doing. There was a CIE document with categories of work.
- Have constrained categories when possible, to make it easier to correlate data.
- Categorize work surface as horizontal or vertical?

There was a discussion about the difference between the questionnaire and the guidelines. Todd said that the guidelines explained the general process for gathering measurements. It could include things like the suggestion to make more than one measurement, if the lighting changed significantly over time, perhaps as a function of the weather. The questionnaire would contain specific information about one specific set of measurements. There should be one questionnaire associated with each set of measurements. (Of course, several questionnaires might repeat the same information if they're all taken in the same office.)

There was a discussion about how to categorize offices and typical viewing conditions. Ann thought we should have a selection of "typical" offices and ask people to select the one most like their office. Todd thought we should ask more specific questions to get the same information. For example: "Number of

windows visible from the office” or “is the work surface horizontal or vertical.” His concern was that different people will do their image observations in different places. If we pick one or more canonical places to measure, we may be missing the places they actually look at images and including ones they don’t care about.

Todd mentioned that there was a CIE document on indoor work categories that might provide useful categories for types of work. (Later Janos mailed that this is probably [ISO 8995:2002/CIE S008:2001](#): joint ISO/CIE standard: Lighting of indoor work places.)

We might want a question about whether people have direct or diffused light in the office. Since most offices have blinds or shades, how many people get direct sunlight on the images.

At this point, we had been meeting for one and a half hours. We decided to adjourn the meeting, even though we had not completed the agenda.

**Next meeting:**

August 17, noon eastern time.